

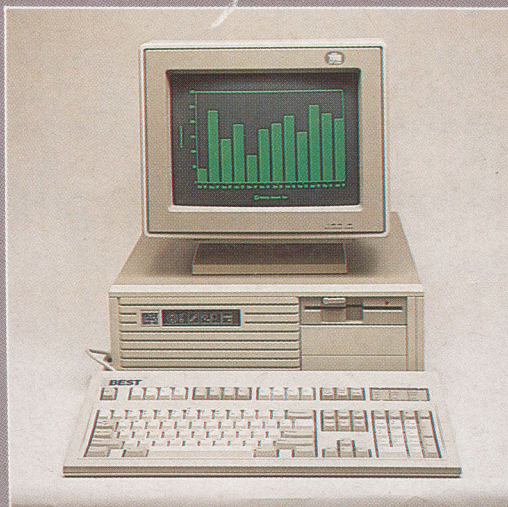
# Electronics & Technology Today

\$3.50  
MM70924  
NOV 89

Canada's Magazine for High-Tech Discovery

F  
A  
L  
L

S  
H  
O  
W  
C  
A  
S  
E



EXCELTRONIX, Best Performer 286 — Circle #1 on RSC



HAMMOND MANUFACTURING, Instrument Cases — Circle #2 on RSC



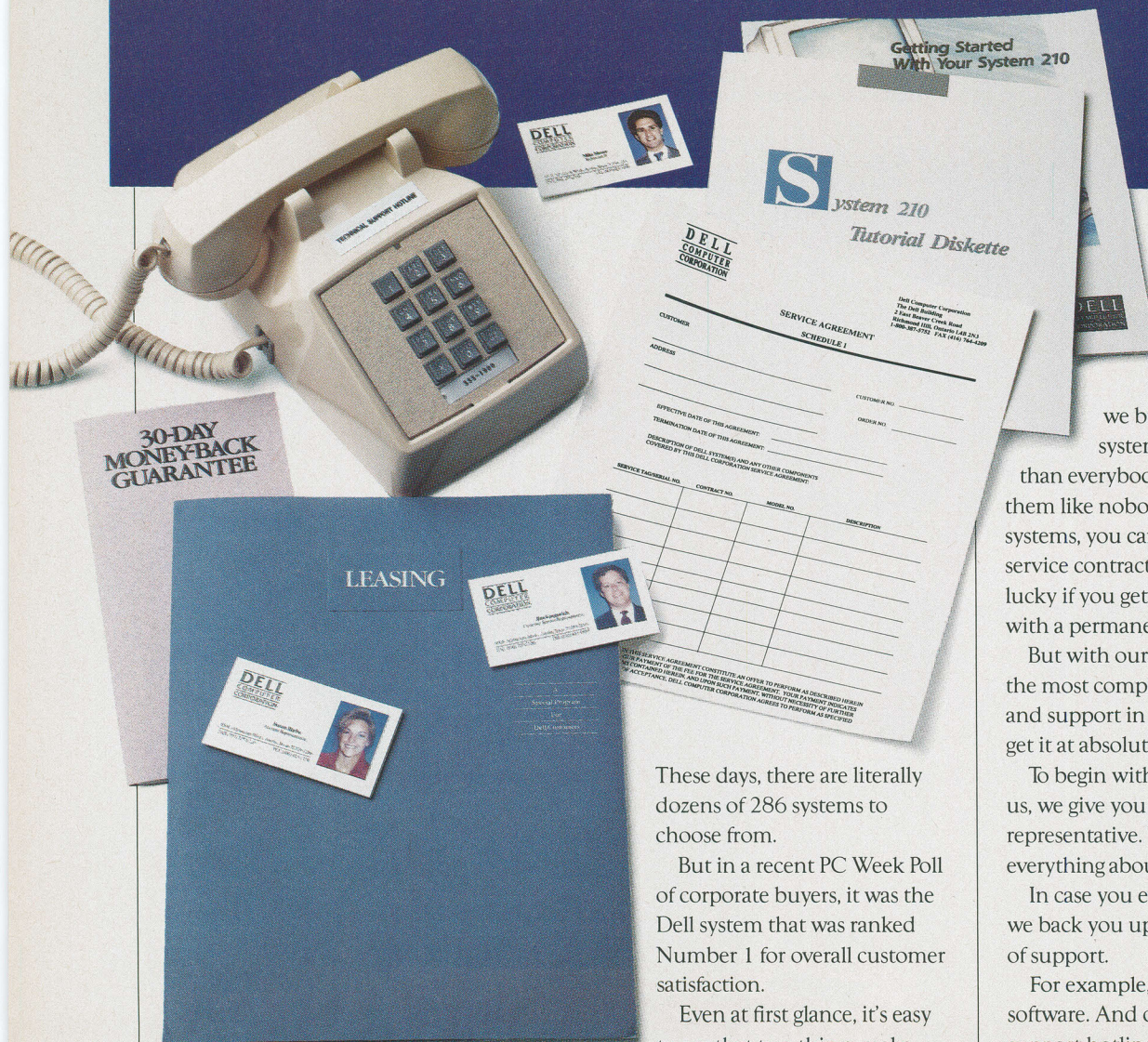
513735\*JAN 90\* ET03\* \*  
KEVIN JOURNEAUX  
68 EASTON AVE  
MONTREAL WESTPQ H4X 1K8

HEWLETT PACKARD, Signal Transmission Analyzer — Circle #3 on RSC





# FOR \$2429, YOU CAN GET CUSTOM CONFIGURATION, SELF-DIAGNOSTIC SOFTWARE, A 30-DAY MONEY-BACK GUARANTEE AND NO-CHARGE ON-SITE SERVICE.



our System 210  
different from all  
the rest.

What we put  
behind it. And what  
we put in it. Because  
we build every one of these  
systems a little bit differently

than everybody else. And we support  
them like nobody else. With some  
systems, you can buy an expensive  
service contract. With others, you're  
lucky if you get a parent company  
with a permanent address.

But with our System 210, you get  
the most complete package of service  
and support in the industry. And you  
get it at absolutely no charge.<sup>Δ</sup>

To begin with, when you buy from  
us, we give you a personal account  
representative. Who gets to know  
everything about you and your system.

In case you ever have a problem,  
we back you up with multiple levels  
of support.

For example, our self-diagnostic  
software. And our toll-free technical  
support hotline. Between these two,

These days, there are literally  
dozens of 286 systems to  
choose from.

But in a recent PC Week Poll  
of corporate buyers, it was the  
Dell system that was ranked  
Number 1 for overall customer  
satisfaction.

Even at first glance, it's easy  
to see that two things make



we can resolve 90% of your problems right away.

And we can take care of the other 10% by the next business day. With every system, you get next-day desktide service provided by a Dell Computer Corporation technician.

## EVERY GUARANTEE HAS A GREAT COMPUTER BEHIND IT.

One of the reasons we can afford to give you so much support is that our systems need almost no support at all.

We assemble the System 210 right here in Canada. We build every system to the highest standard of quality. And we custom configure it to your exact specifications. From the system board up.

And as you can see, we've left nothing out. At \$2429 even the most basic configuration gives you 512 KB of RAM, a 20 MB hard drive, and a VGA monochrome monitor.

Besides the support we already described, the System 210 also comes with a guarantee you won't find anywhere else: Try it in your office for 30 days. If you aren't completely satisfied—for any reason—even if the case colour doesn't match your office—send it back. And we'll refund your money. With no questions asked.

If you'd rather not tie up your money in the first place, a lease plan can be designed to fit the exact needs of your business.

So it doesn't matter whether you're looking for the best 286 system, the best price, or the best support plan in the industry.

Just give us a call.

And we'll send you all three. In the same box.



FOR MORE INFORMATION, CALL:  
**1-800-387-5752**

# AND A GREAT BOX TO KEEP IT IN.



### THE NEW 12.5 MHz 286 DELL SYSTEM® 210.

#### STANDARD FEATURES:

- 80286 microprocessor running at 12.5 MHz.
- Choice of 512 KB, 640 KB\* 1 MB or 2 MB of RAM expandable to 16 MB (6 MB on system board).
- 5.25" 1.2 MB or 3.5" 1.44 MB diskette drive.
- Socket for Intel 80287 math co-processor.
- Integrated diskette and high performance 16-bit VGA video controller on system board.
- LIM 4.0 support for memory over 1 MB.

- Page mode interleaved memory architecture.
- Integrated high performance hard disk interface on system board.
- Enhanced 101-key keyboard.
- 1 parallel and 2 serial ports.
- 3 full-sized 16-bit AT expansion slots available.

#### OPTIONS:

- 40 MB or 150 MB tape drives.
- Intel 80287 math co-processor.
- 128 KB RAM upgrade kit.
- 512 KB RAM upgrade kit.
- 2 MB RAM upgrade kit.

△ Extended Service Plan also available.

System 210	With Monitor		
Hard Disk Drives	VGA Mono 512 KB RAM	VGA Colour Plus 512 KB RAM	Super VGA Colour 512 KB RAM
20 MB	\$2,429	\$2,849	\$2,999
40 MB	\$2,719	\$3,139	\$3,289
100 MB	\$3,569	\$3,989	\$4,139

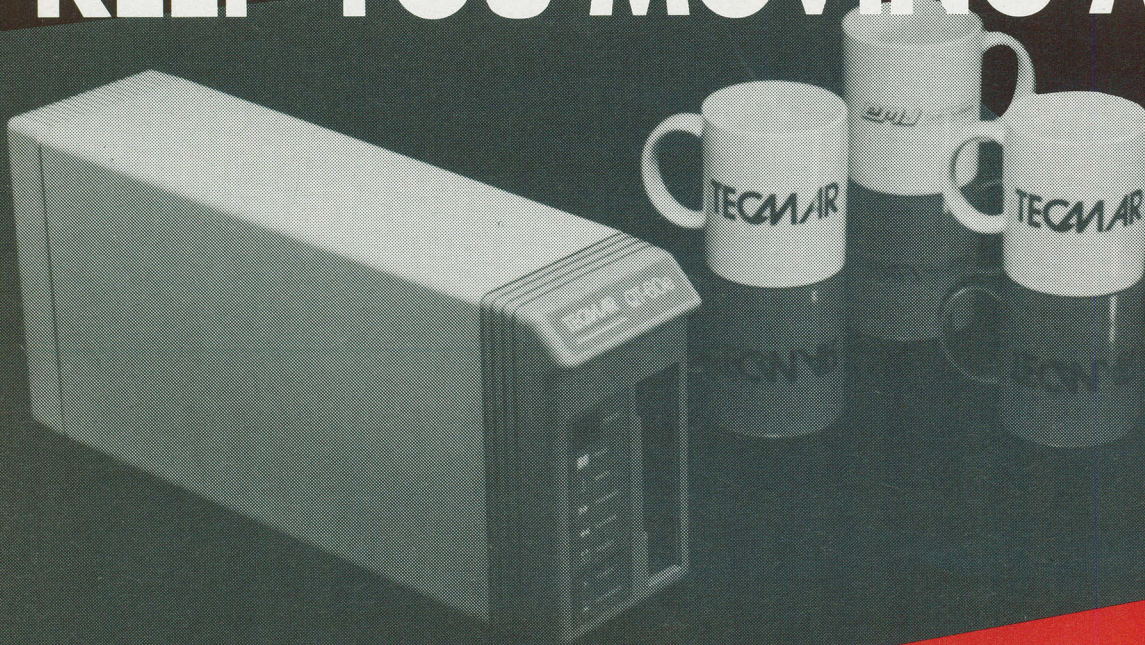
All the above systems come with 512 KB RAM.

\*640 KB versions available for an additional \$120.00.

All prices and specifications are subject to change without notice. Dell cannot be responsible for errors in typography or photography. △Service in remote locations will incur additional travel charges. Dell System is a registered trademark of Dell Computer Corporation. ©1989 DELL COMPUTER CORPORATION. ALL RIGHTS RESERVED.



# THE TAPE BACK-UPS THAT KEEP YOU MOVING AHEAD



**Tecmar Tape Back-up Systems. They Give You The Confidence of Knowing What's Behind You is Never History.**

Tecmar QT tape back-up units give users the confidence to plow ahead with their work. That's because they never have to worry about losing any.

All Tecmar QT back-ups are easy to use and totally compatible. They can fit right in IBM PC's, AT's or PS/2's or work as portable units on their own.

Each system in Tecmar's entire spectrum from 60 to 150MB can be shared among several users through a host adapter board. And each QT system ships with the famous QTOS menu driven software or is open to usage with the industry-standard software of Systos. They're also compatible with popular operating systems like Xenix, Unix, QNX and more.

Tecmar QT tape back-up systems. Always look to the leader when you're looking for someone to back you up.

Call EMJ today to find out more about our great service and support on the complete line-up of Tecmar QT tape back-up units. You'll soon see what EMJ care and competence is all about.

EMJ Data Systems. We're Canada's High Performance Distributor because we treat each and every customer the only way we know how. With honesty, courtesy and with excellent support and value on computer products that people ask for from coast to coast.



**Data Systems Ltd.**

**HEAD OFFICE:**

**GUELPH**

(519) 837-2444

FAX (519) 836-1914

**BRANCHES:**

**Vancouver**

(604) 875-9344

FAX (604) 875-6393

**Calgary**

(403) 229-1535

FAX (403) 244-4469

**Winnipeg**

(204) 949-0055

FAX (204) 949-0063

**Toronto**

(416) 454-2940

**Montreal**

(514) 745-4500

FAX (514) 745-2886

**Halifax**

(902) 835-1621

FAX (902) 835-9127

\*TOLL FREE (Man., Ont., Que., N.B., N.S., P.E.I.): 1-800-265-7212

(B.C., Alta.): 1-800-663-9048

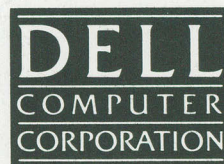


# IF YOU CAN'T CALL, PLEASE WRITE.

Regardless of who you are or what your needs Dell designs and builds computer systems to satisfy you *personally*.

Because we communicate directly with every one of our customers we can individually configure each system for each user. That's the direct advantage and one of the reasons Dell computers have dominated customer satisfaction polls for the last two years.

On the back of this card you'll find a listing of the complete lineup of Dell Systems. For more information on any one of these just send in the card below. Or call our Toronto office toll-free.



## 1-800-387-5752



**DELL COMPUTER CORPORATION**

The Dell Building  
2 East Beaver Creek Road  
Richmond Hill, Ontario  
L4B 9Z9

Business Reply Mail  
No postage stamp necessary  
if mailed in Canada  
Postage will be paid by



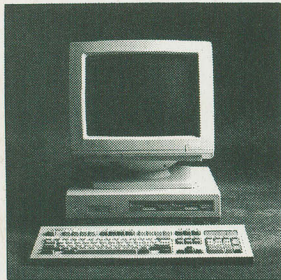
**DELL COMPUTER CORPORATION**

The Dell Building  
2 East Beaver Creek Road  
Richmond Hill, Ontario  
L4B 9Z9

Business Reply Mail  
No postage stamp necessary  
if mailed in Canada  
Postage will be paid by



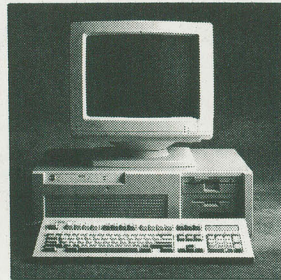
# DECISIONS. DECISIONS.



**THE DELL SYSTEM® 220**  
20 MHz 286

The 80286-based Dell System 220 is a fast, powerful executive workstation. Running at 20 MHz, the System 220 actually outperforms many Intel 386-based computers while selling for half their price. And you don't have to sacrifice performance or expandability to put a small footprint system on your desk. The System 220's highly-integrated design, with a number of built-in controllers, frees all three full-sized expansion slots for future expandability, adds system reliability, and reduces the cost of expansion.

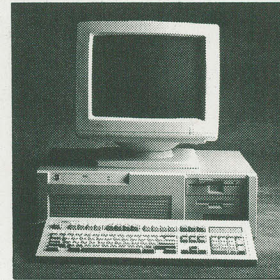
System 220	With Monitor	
Disk Drives	VGA Mono	VGA Colour Plus
One Diskette Drive	\$3,269	\$3,699
40 MB-29 ms Hard Disk	\$4,259	\$4,689
100 MB-25 ms Hard Disk	\$5,119	\$5,539



**THE DELL SYSTEM® 310**  
20 MHz 386

For business users who need a 386 system, this is the best combination of performance and value available. Running at 20 MHz, this 32-bit system is faster than the IBM PS/2<sup>®</sup> Model 70 and the Compaq<sup>®</sup> 386/20e. Since it has the same high performance disk drives and Intel<sup>®</sup> Advanced 82385 Cache Memory Controller as our System 325, it brings a new level of performance to complex spreadsheets and databases. As you might expect, it runs windowed software at extremely high speed. It's also well-suited for desktop publishing applications, or as a network file server.

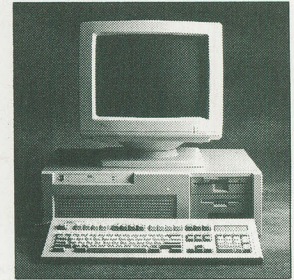
System 310	With Monitor & Adapter	
Disk Drives	VGA Mono	VGA Colour Plus
40 MB-29 ms IDE	\$5,399	\$5,829
100 MB-25 ms IDE	\$6,249	\$6,679
150 MB-18 ms ESDI	\$6,959	\$7,389
322 MB-18 ms ESDI	\$8,099	\$8,519



**THE DELL SYSTEM® 316**  
16 MHz 386SX™

The System 316 is a full-featured system designed to give you uncompromising 386/16 MHz performance. But for a price that's somewhere in the neighbourhood of a 286-based system. The System 316 has a total of seven open slots. Leaving you enough room to add modems or network cards, fax boards, high-performance graphics cards or tape backups. If the System 316 is beginning to sound like the perfect business computer, it's because it is. How perfect, though, is entirely up to you. Because every 316 is custom configured to give users exactly what they need.

System 316	With Monitor & Adapter	
Disk Drives	VGA Mono	VGA Colour Plus
40 MB-29 ms IDE	\$4,119	\$4,549
100 MB-25 ms IDE	\$4,969	\$5,399
150 MB-18 ms ESDI	\$5,679	\$6,109
322 MB-18 ms ESDI	\$6,819	\$7,249



**THE DELL SYSTEM® 325**  
25 MHz 386

When you need the highest possible performance of any 386, this is the technology of choice. Running at 25 MHz, the System 325 is faster than the Compaq<sup>®</sup> 386/25. Besides unequalled speed, it also offers Intel's<sup>®</sup> Advanced 82385 Cache Memory Controller and high performance disk drives. As a result, it gives you workstation-level performance for CAD/CAM and desktop publishing applications. It's also especially effective as a network file server, and more than capable of handling the most complex spreadsheets and databases.

System 325	With Monitor & Adapter	
Disk Drives	VGA Mono	VGA Colour Plus
40 MB-29 ms IDE	\$6,959	\$7,389
100 MB-25 ms IDE	\$ 7,809	\$ 8,239
150 MB-18 ms ESDI	\$ 8,519	\$ 8,949
322 MB-18 ms ESDI	\$ 9,659	\$10,089

All prices and specifications are subject to change without notice. Dell cannot be responsible for errors in typography or photography. Service in remote locations will incur additional travel charges. <sup>®</sup> IBM PC/AT and PS/2 are owned by International Business Machines. Compaq and Intel are trademarks of their respective companies. 386 and 386SX are trademarks of Intel Corporation. ©1989 DELL COMPUTER CORPORATION. ALL RIGHTS RESERVED.

For more information on the full line of Dell high-performance 286 and 386 systems, simply complete and mail us this card.

We also offer a full line of software, peripherals, enhancement products and networking solutions for your one-stop shopping convenience.

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Address: \_\_\_\_\_

Company: \_\_\_\_\_

City: \_\_\_\_\_ Prov.: \_\_\_\_\_ Postal Code: \_\_\_\_\_

Phone: Business ( ) \_\_\_\_\_ Home ( ) \_\_\_\_\_

I'm most interested in:

- ☐ 286-based systems  
☐ 386-based systems  
☐ Other \_\_\_\_\_

I am interested in computer products for:

- ☐ Home Use  
☐ Business Use

I am an:

- ☐ End-User  
☐ Computer Consultant  
☐ Reseller  
☐ Corporate Purchaser  
☐ DP/MIS Manager

My requirement is:

- ☐ Immediate  
☐ 1-3 months  
☐ Over 3 months  
☐ Information only

How many PCs do you (your company) plan to purchase in the next twelve (12) months?

- ☐ 1-10  
☐ 11-20  
☐ Over 21

Please send material in:

- ☐ English ☐ French

HB-012

For more information on the full line of Dell high-performance 286 and 386 systems, simply complete and mail us this card.

We also offer a full line of software, peripherals, enhancement products and networking solutions for your one-stop shopping convenience.

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Address: \_\_\_\_\_

Company: \_\_\_\_\_

City: \_\_\_\_\_ Prov.: \_\_\_\_\_ Postal Code: \_\_\_\_\_

Phone: Business ( ) \_\_\_\_\_ Home ( ) \_\_\_\_\_

I'm most interested in:

- ☐ 286-based systems  
☐ 386-based systems  
☐ Other \_\_\_\_\_

I am interested in computer products for:

- ☐ Home Use  
☐ Business Use

I am an:

- ☐ End-User  
☐ Computer Consultant  
☐ Reseller  
☐ Corporate Purchaser  
☐ DP/MIS Manager

My requirement is:

- ☐ Immediate  
☐ 1-3 months  
☐ Over 3 months  
☐ Information only

How many PCs do you (your company) plan to purchase in the next twelve (12) months?

- ☐ 1-10  
☐ 11-20  
☐ Over 21

Please send material in:

- ☐ English ☐ French

HB-012



## FALL SHOWCASE COVER FEATURES

For information about the products  
on this month's cover  
please use our Reader Service Card  
or contact the company direct.

### The BEST Performer 286 from EXCELTRONIX

433 Horner Avenue, Unit 12,  
Etobicoke, M8W 4Y4  
(416) 252-8543 FAX: 416-252-5124  
Contact: Andy Honl  
Circle #1 on Reader Service Card

### Instrument Cases from HAMMOND

MANUFACTURING Co. Ltd.  
394 Edinburgh Rd. North, Guelph,  
Ontario N1H 1E5  
(519) 822-2960 or (416) 456-3770  
FAX: 519-822-0715  
Contact: Dorothy Smith  
Circle #2 on Reader Service Card

### Digital Transmission Analyzer from HEWLETT PACKARD

6877 Goreway Drive, Mississauga,  
Ontario L4V 1M8  
(416) 678-9430 FAX: 416-678-9421  
Contact: Pat Farrell  
Circle #3 on Reader Service Card

### Product Catalogue from CANADA REMOTE SYSTEMS

1331 Crestlawn Drive, Unit D,  
Mississauga, Ontario L4W 2P9  
(416) 624-8193 FAX: 416-624-8064  
Contact: Brenda Brown  
Circle #4 on Reader Service Card

### Replacement Data Display Tube from ECG CANADA

(514) 685-5800 FAX: 514-685-5804  
(800) 361-3198 (Quebec and East)  
(800) 361-2564 (West and Nfld.)  
Contact: Jo-Ann Lovat  
Circle #5 on Reader Service Card

### Complete Analog ATE System from FERNBANK

ELECTRONICS SYSTEMS  
Box 850, Stittsville, Ontario K0A 3G0  
(613) 831-0761 FAX: 613-831-2331  
Contact: Roger Stone  
Circle #6 on Reader Service Card

### Chemtronics Environmentally Safe Products from PACO ELECTRONICS

20 Steelcase Road, Unit 10,  
Markham, Ontario L3R 1B2  
(416) 475-0740 FAX: 416-475-0464  
Contact: Don Cohen  
Circle #7 on Reader Service Card

# Electronics & Technology Today

Canada's Magazine for High-Tech Discovery

Volume 13, Number 11

November 1989

## FEATURES

**Stabilized Power Supplies, Part 2** .....8  
The basic theory of PSU design and how to prevent potential problems.

**Ventura vs XPress** .....19  
A comparison of the two top contenders in publishing software.

**Techie's Guide to C Programming, Part 11** .....24  
Steve Rimmer's monthly programming guide.

**An Interview with Philippe Kahn** .....30  
A conversation with the founder of Borland International, Inc.

**PC Hardware Interfacing, Part 11** .....42  
Continuing our hardware series

## PRODUCT REVIEW

**VGA Edge** .....12

## PROJECTS

**Variable Stabilized Power Supply** .....8

**Xenon Beacon** .....26

**Four-Way Chaser** .....34

## INFORMATION

**For Your Information** .....6

**Software Catalogue** .....Insert

**Advertiser's Index** .....44

**Classifieds** .....44



## **Electronics & Technology Today**

**Electronics & Technology Today**  
is published 12 times a year by:  
Moorshead Publications Ltd.  
1300 Don Mills Road, North York, Ontario  
M3B 3M8 (416)445-5600 FAX: (416)445-8149

Editor: William Markwick  
Director of Production: Papu Leynes  
Art Direction: Kevan Buss  
Circulation Manager: Sharon Cernecca

President: H.W. Moorshead  
Publisher & V.K. Marskell  
Executive Vice-President:  
Vice-President—Sales: A. Wheeler  
Vice-President—Finance: B. Shankman  
Production: Bo Bentzen  
Advertising Manager: Paul Smith  
Office Manager: P. Dunphy  
Reader Services: R. Cree  
J. Cardoni  
Advertising Services: M. Millett  
H. Brooks

**Newsstand Distribution:**  
Master Media, Oakville, Ontario

**Subscriptions:**  
\$22.95 (one year), \$37.95 (two years).  
Please specify if subscription is new or a  
renewal.

Outside Canada (US Dollars). U.S.A. add \$3.00  
per year. Other countries add \$5.00 per year.

Electronics & Technology Today  
is indexed in the Canadian Magazine Index  
by Micromedia Ltd.

Back copies are available in microfilm form  
from Micromedia Ltd. 158 Pearl Street,  
Toronto, Ontario M5H 1L3 (416)593-5211.

**Printed by:**  
Heritage Press Ltd., Mississauga, Ontario

ISSN 07038984

Moorshead Publications also publishes PETS  
Magazine, Computing Now!, Computers in  
Education, Business Computer News and  
Government Purchasing Guide.

Circulation independently audited by  
MURPHY & MURPHY Chartered  
Accountants.

**Postal Information:**  
Second Class Mail Registration No. 3955.  
Mailing address for subscription orders,  
undeliverable copies and change of address  
notice is:

**Electronics & Technology Today**  
1300 Don Mills Road, North York, Ontario  
M3B 3M8.

# FOR YOUR INFORMATION

### **COPYRIGHT**

All material is subject to worldwide  
copyright. PCB designs are copyright and  
may not be sold without permission.

### **LIABILITY**

No responsibility whatever is accepted for  
failure of projects to perform for any  
reason, and no responsibility is accepted  
for any injury or damage caused by any  
fault in design.

### **EDITORIAL QUERIES**

We cannot answer telephone queries.  
Written queries must be accompanied by a  
stamped, self-addressed envelope, relate to  
recent articles and must not involve the  
staff in any research.

### **PCB SUPPLIERS**

We do not supply printed circuits or kits,  
and we do not keep track of availability.  
However, PCBs for projects are available  
from the following mail order sources:

**B-C-D Electronics**, PO Box 6326, Stn. F.,  
Hamilton, Ontario L9C 6L9.

**K.S.K. Associates**, PO Box 266, Milton,  
Ontario L9T 4N9.

**Spectrum Electronics**, 14 Knightswood  
Crescent, Brantford, Ontario N3R 7E6.

### **Article Changes**

Well, we had to delay two articles that were  
supposed to be in this issue. The amateur  
radio article will be held while we round up  
some equipment we didn't want to miss.  
The AutoCAD article this month, which  
was to be on true 3D drafting, will have to  
wait until next month while we explore  
some new features that were discovered at  
the last minute. Sorry about that.

### **New Distributor**

Products available from Duncan Instru-  
ments in Weston, Ontario, will be dis-  
tributed in western Canada by Fairwest  
Sales Ltd., 1620 Main St., Vancouver, BC  
V6A 2W8, (604) 685-1473, Fax 681-  
7712. All shipments and invoices will be  
issued from Duncan Instruments, but or-  
ders may be placed via Fairwest Sales.

### **New HP Test Set**

Hewlett-Packard's HP 3784A digital-  
transmission analyzer is a rugged, com-  
pact, single-instrument solution to digital-  
transmission testing at 2, 8 and 34 Mbit/s,  
with combined BER (bit error rate) and jit-  
ter measurements. Intended for telecom-  
equipment manufacturers and telecom-  
network operators, the unit is easily  
transported in the field, and can be rack  
mounted for automated-production test-  
ing. All error and jitter-performance  
measurements conform to current CCITT  
recommendations. The standard analyzer  
with BER measurements is just over  
\$13,000 Canadian; added jitter-measure-  
ment capability is about \$7,500 extra.  
Hewlett-Packard Canada, 6877 Goreway  
Drive, Mississauga, Ontario L4V 1M8,  
(416) 678-9430.

Circle No. 12 on Reader Service Card

### **Would You Lie to a Computer?**

Research carried out at Georgia Tech  
recently is believed to be the first examina-  
tion of the validity of computerized job in-  
terviewing. Participants were interviewed  
by one of four techniques: a friendly  
human interviewer, a "cold" interviewer,  
paper & pencil application forms, or a  
computer. The researchers found a lot of  
exaggeration, in particular in the face-to-  
face situations; it was felt that the non-so-  
cial interview conditions — paper & pen-  
cil and computer — resulted in more  
honest responding. In other words, com-  
puterized interviewing may reduce the so-  
cial pressure to "make a good impression"  
with the interviewer, sometimes regard-  
less of the truth.

E&TT November 1989



# For Your Information

## CAD Contest

CADalyst magazine and Autodesk Inc. announce the first contest to encourage the effective use of AutoCAD, AutoShade, AutoSolid and the new Autodesk Animator. The Autodesk Images Awards will be presented at A/E/C systems '90, June 12-15, 1990, in Atlanta, Georgia. Entries will be judged on the basis of artistic merit, originality and additional criteria outlined in the entry form. There is no entry fee. Entrants will compete in six categories: practising professionals, presentation specialists, business graphics specialists, independent artists, faculty and grad students and undergrad students. These categories are divided into still and animated divisions. Any subject matter is permissible as long as the submission was created with Autodesk software. Animation entries should be submitted on VHS videotape. Stills should be submitted as photographs. Entry forms can be obtained from Laurie Grant, CADalyst Publications, 314 E. Holly, #106, Bellingham, Washington 98225, (604) 873-0517, or from Andrew Zarrillo, Public Relations Coordinator, Autodesk Inc., 2320 Marinship Way, Sausalito, California 94965, (415) 332-2344, ext. 4704.

Circle No. 10 on Reader Service Card

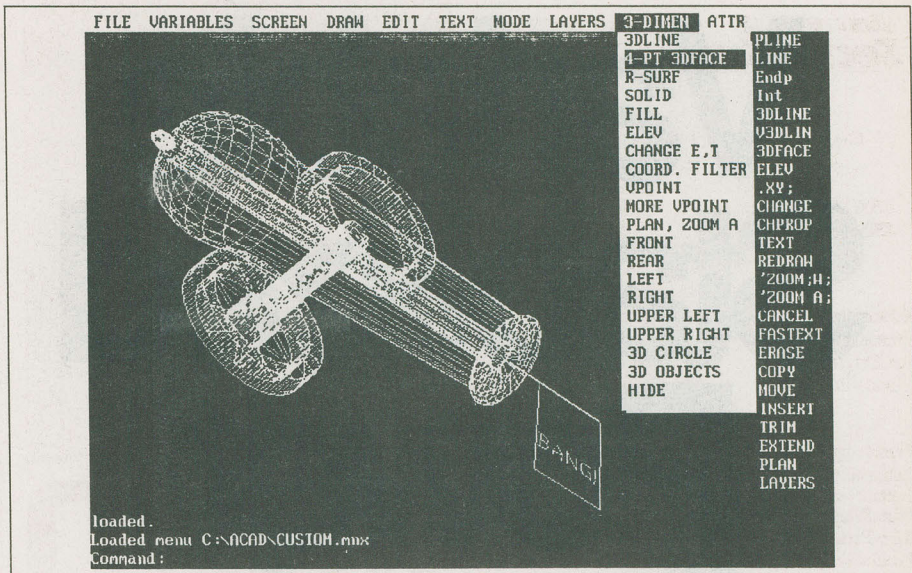
## New Op Amp

PMI announces the OP-249, a JFET precision op amp that features fast settling time (1.2us), high slew rate (22V/us) and low distortion. The offset voltage is 300uV maximum and offset drift is less than 0.5uV/C. Applications include high performance D/A converters, precision DC circuits, high-speed signal conditioning, active filters and sample/hold circuits. Available in 8-pin ceramic or plastic DIP or TO-99 metal can. At PMI dealers, or contact Precision Monolithics Inc., 1500 Space Park Drive, PO Box 58020, Santa Clara, CA 95052-8020, (408) 727-9222, Fax 727-1550.

Circle No. 11 on Reader Service Card

## Ahem...

The mind reels. Our Almost Free AutoCAD disk for Release 9 (advertised in E&TT software sections as well as our other publications) contains a custom-written menu to replace the AutoCAD menu and make everything much faster and more convenient. However, a number of readers who don't like reading closely have assumed that we're selling E&TT November 1989



AutoCAD (a \$4000 value) for \$19.95. This is not true. We do not sell AutoCAD. Not at 1/200 of its retail price.

Our menu, however, is a real whiz-bang for both professionals and occasional users, and includes all kinds of nifty documentation about commands and

menu structure that you can't find without a lot of digging. And, yes, the menu for Release 10 really is on its way — it's just that there's a whole truckful of 3D commands that we're trying to get organized as efficiently as possible.

And yes, we'll change the ad...



## HI-TECH TRAINING

*Practical, Fast*

### ELECTRONICS TECHNICIAN:

Basic level- No previous training needed

### COMPUTER TECHNOLOGY:

Advanced level- Digital electronic knowledge needed

### DEDICATED TO PRACTICAL ELECTRONICS TRAINING SINCE 1950

Resident Training in Toronto

## RET'S CAREER TRAINING

2057 Danforth Ave. 698-5287

(at Woodbine Subway)

Financial assist. possible Effective job placement for over 35 years

CALL NOW OR VISIT US FOR FREE INFORMATION

DAY & EVENING COURSES STARTING SOON

Circle No. 14 on Reader Service Card



# Variable Stabilized Power Supply

A0-12V general-purpose regulated power supply.

STEVE KNIGHT

The circuit diagram of the second project, a Variable Stabilized Power Supply, is shown in Fig. 1. Here a transformer is required giving an output of 15V to 18V at 2A, plus a winding giving 5V to 6V at a current of 10mA. *The windings must be separate.* A separate small transformer can be used.

The main secondary output from the transformer T1 is rectified by the bridge REC1 in the usual way and smoothed by capacitor C1. The peak voltage across C1 can be up to 25V if you use an 18V transformer and a minimum working voltage of 35V should be selected. The capacitor specified has such a working level and a ripple rating of 3A; this last figure is as important as the former.

This unregulated supply is connected to the regulator system consisting of integrated circuit IC1 and the series pass transistor TR2, with its base bias controlled by TR1. IC1 is a high gain amplifier functioning as a differential comparator.

The non-inverting input (pin 3) of IC1 is fed from potentiometer VR1 which is connected across the Zener diode D1. The Zener maintains a stable 13V across its ends; the slider of VR1 can therefore be varied between 0V and 13V.

The inverting input (pin 2) to the IC1 is connected to the stabilized output of the supply. Whatever the potential at the slider of VR1 happens to be, this is compared with the output potential and any difference is detected and amplified by IC1.

The output of IC1 then adjusts the base voltage of TR1 in such a way that the difference is reduced (theoretically) to zero. Hence the output voltage is held at whatever voltage setting has been selected by VR1.

A 13V reference Zener used as the output is always slightly less than this reference because of the drop across TR2. An output of up to 12V can therefore be obtained. If the output tends to change for any reason, that change will be immediately corrected, so the output will be *stabilized*.

## Thermal Trip

As this simple circuit does not incorporate a current limiting feature (as later designs will) a thermal trip X1 is included in the positive feed line following the rectifier. This will trip at a current of 2A so the unit will be protected against inadvertent short-circuits or serious overload.

You can, if you wish, replace this trip with a panel mounted 2A fuse. This saves a little money, but is not so convenient as

E&TT November 1989







# Stabilized Power Supplies

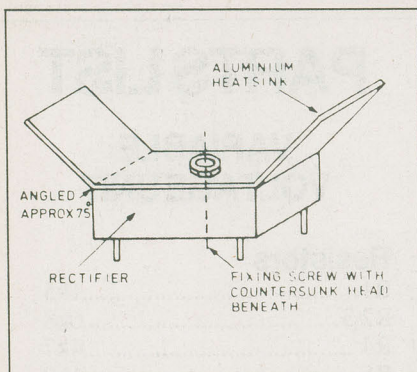


Fig. 3. Mounting the small aluminum heatsink on the bridge rectifier.

template for the transistor mounting holes, making sure there is adequate clearance round the base and emitter pins.

The board is now placed against the heatsink and the two fixing hole positions marked through; keep the top edge of the board in line with the top edge of the heatsink. None of this is particularly critical and can be judged by eye well enough.

The 2N3055 transistor should now be mounted on the aluminum, using the usual insulating bushes and washer. A soldering tag is fitted under the upper nut so that connection can be made to the collector (the case) of transistor TR2.

Check that the transistor is not short-

ing to the aluminum, and then solder flexible leads to the collector tag and the base and emitter pins for later connection to the board. Use three colours for this so as to avoid any future confusion.

The board can now be screwed to the heatsink using half-inch spacers and the three leads from TR2 brought over the top edge of the board and soldered to the appropriate Vero pins at the points C (collector), B (base) and E (emitter). Fig. 5 shows the general appearance of the completed mounting.

## Boxing Up

The case mentioned in the components list

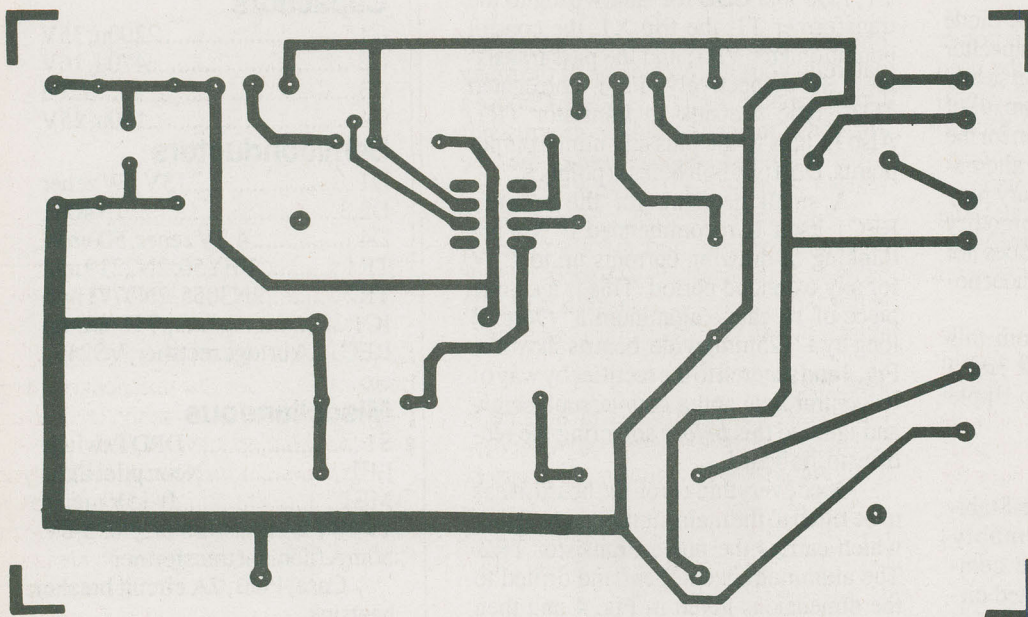
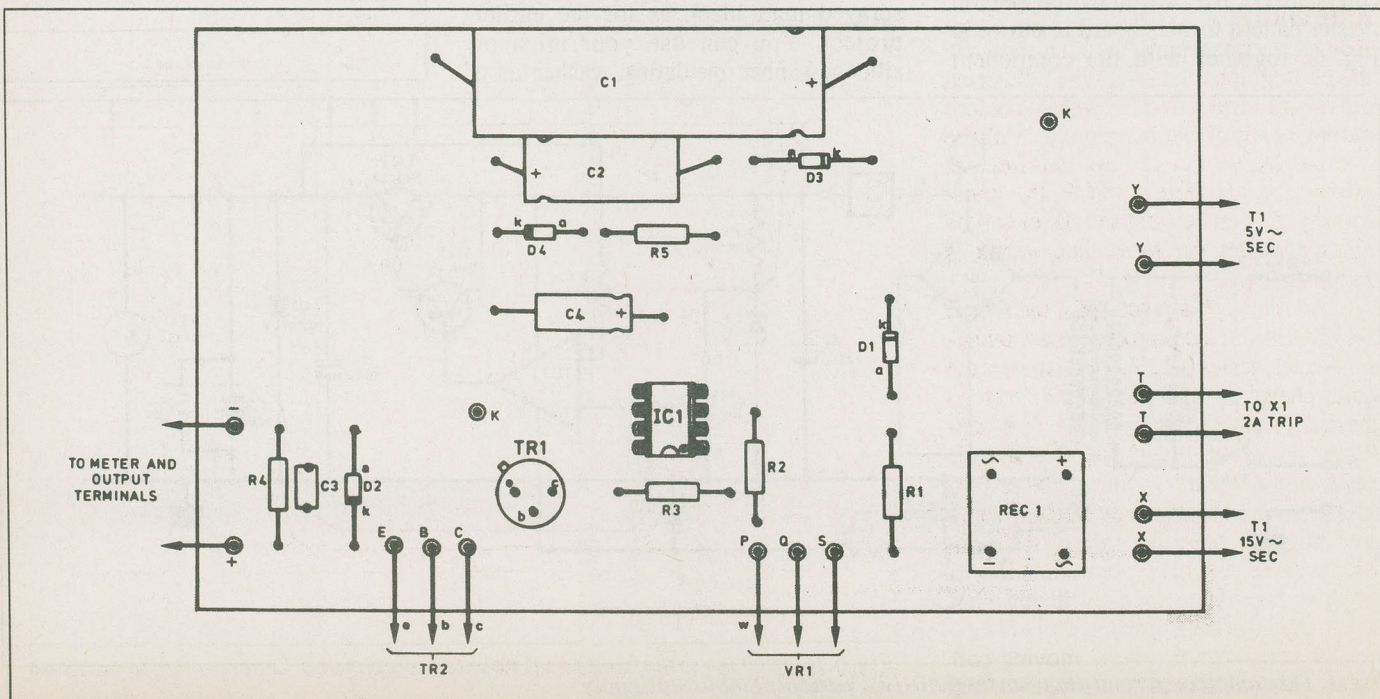


Fig. 2. Full-sized PCB foil master drawing, foil side and (below) the component side layout diagram. A small heatsink should be clipped onto TR1.





# Stabilized Power Supplies

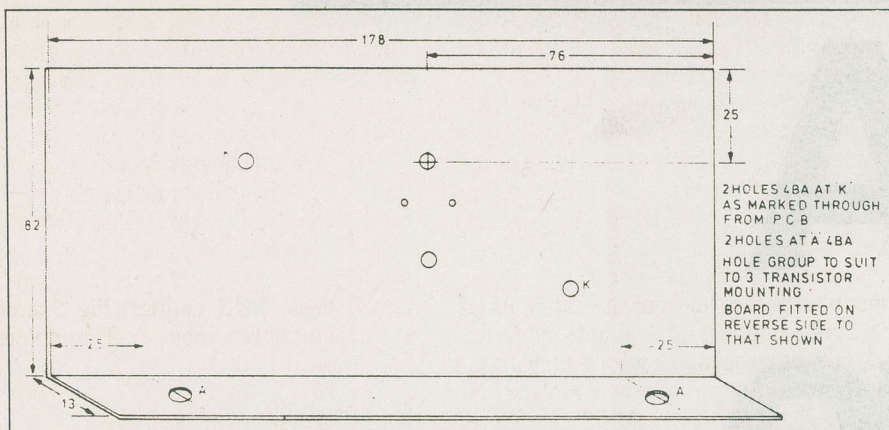


Fig. 4. drilling details and dimensions of the main heatsink.

makes an attractive housing for this power supply, but any alternative may be used provided it measures at least 8" (203mm) by 4" (102mm) by 6in. (152mm) back to front. The front panel carries the meter (which is optional — you may prefer to calibrate directly onto a panel scale), the thermal trip X1, the voltage control VR1, the power on/off switch and indicator neon and the DC output terminals.

If you use the specified case, the transformer and the printed board should be mounted on the internal chassis provided with these cases in the positions indicated in the photographs. Exact placings are not critical but should not be as far to the rear of the chassis as possible so that room is left for the inwardly projecting components mounted on the rear of the front panel.

## Interwiring

A suggested front panel layout is shown in the photographs; lettering can be carried out using Letraset or other systems before mounting any of the components. With the internal chassis now screwed into the case, interwiring between the PCB, the transformer secondaries and the panel can be quickly made; the panel interwiring is shown in Fig. 6.

A word at this point about the meter: the one used in the prototype is a moving-iron meter, scales 0-15V. These meters are quite cheap as analogue instruments go these days and the fact that the scale is non-linear and the movement does not have the smoothness found in more expensive moving-coil units is no great hardship in the present usage. Over the bulk of the scale length there is a good approximation to linearity, anyway, and it does tell you what is coming out of the terminals.

If you wish to use a moving-coil meter, you will have to hunt around to find

one scaled 0-15V (or thereabouts); alternatively, you can rescale one of the many units available from parts stores. Choose a 1mA basic meter, then add a series resistor to convert it to a voltmeter to suit the new scaling. A small preset is useful here.

You can if you wish, of course, omit the meter entirely and draw yourself a panel scale calibrated 0-12V (or 0-15V). It is not a difficult job to mark a scale off against an external voltmeter as monitor.

## Testing

There is little to go wrong with this simple power supply unit and it should work correctly right away. If you want to get up to 15V output, replace D1 with a 16V type, and you may have to replace D4 also with a 4.7V type. Nothing else needs any modification.

Typical voltage levels are shown in

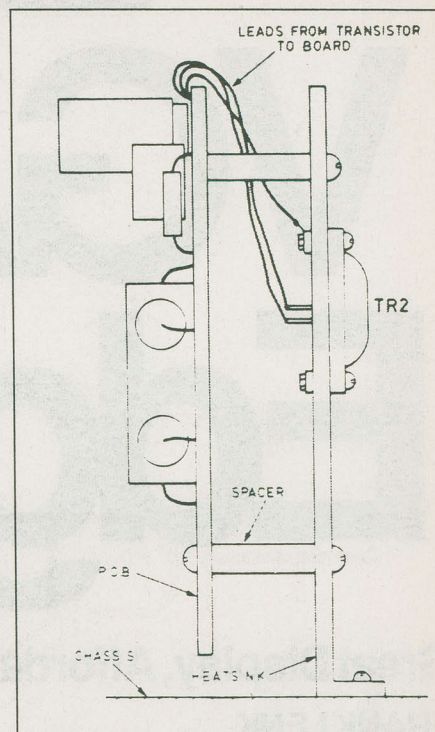


Fig. 5. Mounting the circuit board on the main heatsink.

the circuit diagram of Fig. 3.8. These can be used as a guide if the unit does not work properly and will probably enable any gross fault to be quickly located.

The most likely causes of difficulty are the old favorites of reversed diodes or electrolytics, so watch out for these particularly. The output current is nominally 1.5A as maximum, but 2A can be drawn for periods not exceeding ten minutes or so.

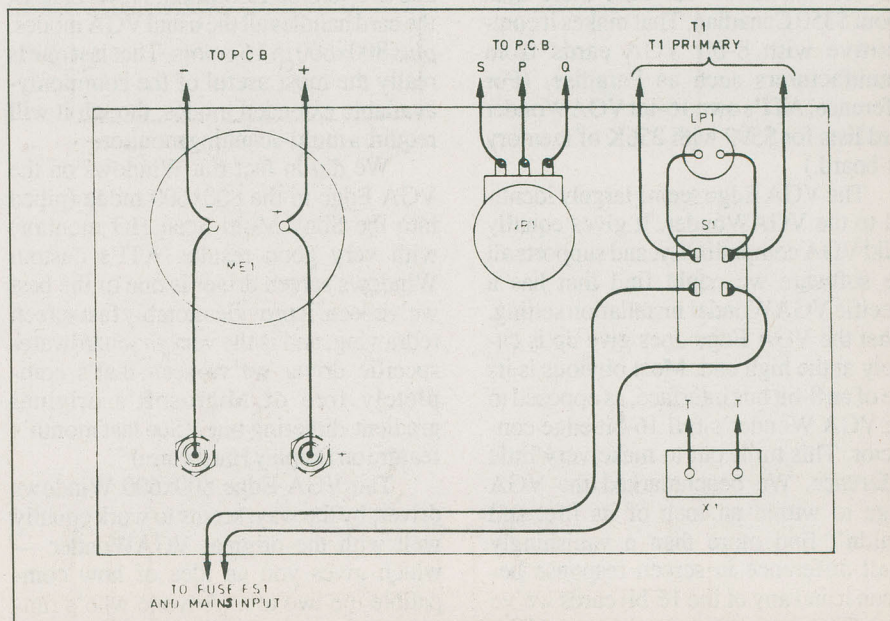


Fig. 6. Interwiring to the front panel mounted components. Letters relate to points on the PCB.



# VGA Edge

Great Display, Affordable Price, No Rough Edges

FRANK LENK

**A**TI Technologies has built a reputation for good, low-cost video adapters. Its VGA Wonder card has been gaining wide acceptance as a moderately-priced extended VGA. Now ATI is topping itself, by introducing its cheapest VGA adapter yet—the *VGA Edge*.

The most significant feature of the VGA Edge, obviously, is its price — so let's start with that. The VGA Edge will list for \$469, which implies that it should sell "on the street" for little more than about \$350 Canadian. That makes it competitive with 8-bit VGA cards from manufacturers such as Paradise. (For reference, ATI's own 16-bit VGA Wonder card lists for \$599 with 256K of memory on-board.)

The VGA Edge seems largely identical to the VGA Wonder. It gives equally solid VGA compatibility, and supports all the software we could find that has a specific VGA Wonder installation setting. What the VGA Edge does give up is entirely at the high end. Most obvious is its use of an 8-bit bus interface, as opposed to the VGA Wonder's full 16-bit edge connector. This turns out to make very little difference. We benchmarked the VGA Edge to within an inch of its life, and couldn't find more than a vanishingly small difference in screen response between it and any of the 16-bit cards we've tried. (The sad fact is that neither the VGA standard nor the AT architecture are par-

ticularly well adapted to take advantage of a 16-bit video data path.)

The other chief limitation of the VGA Edge is on-board memory — just 256K, non-expandable. (The VGA Wonder, by comparison, comes in both 256K and 512K versions, with the former configuration being user-upgradable.) The low memory capacity eliminates some of the most advanced video modes, such as 1024x768, or 256 colors at anything above 640x400 resolution. Nevertheless, the card handles all the usual VGA modes, *plus* 800x600 in 16 colors. That last one is really the most useful of the commonly-available extended modes, though it will require a multi-scanning monitor.

We did in fact run Windows on the VGA Edge in the 800x600 mode (piped into the Sony Multi Scan HG monitor) with very good results. ATI's custom Windows screen driver is one of the best we've seen. It provides notably fast screen redrawing, and is the very *first* hardware-specific driver we've seen that's completely free of Microsoft's original gradient-dithering bug. (See last month's feature on Display Hardware.)

The VGA Edge 800x600 Windows driver, by the way, seems to work equally well with the original VGA Wonder — which gives you an idea of how compatible the two are. (Anyone who's running Designer or Corel Draw on a VGA Wonder should definitely get after

ATI for the updated driver.)

Users still waiting to make the plunge into VGA should note that inexpensive 8-bit cards such as the VGA Edge allow them to move up to at least monochrome VGA for a total investment of no more than \$500-\$600. Color VGA monitors are coming down fast as well; even NEC now has low-end models such as the MultiSync 2D and 2A.

If that still sounds expensive, try it this way: consider an average AT compatible, fully loaded with cheap monographics for about \$2000, or with mono VGA for \$2200 — or with full color for maybe \$2500 or so. Now that the PC finally has a video standard that makes sense, it makes even more sense to spend the few extra bucks to tie into it.

In fact, if you're willing to splurge for a *multi-scanning* monitor, we'd recommend throwing in another couple of hundred bucks more, and moving all the way up to a full-capacity extended-VGA adapter like the VGA Wonder; the selection of extended modes is worth it. However, if you just want nice straight-up VGA, with a workable 16-color 800x600 mode thrown in for things like Windows or Ventura, the VGA Edge looks like an excellent alternative.

**VGA Edge:** \$469 suggested list. From ATI Technologies Inc., 3761 Victoria Park Ave., Scarborough, ON M1W 3S2; phone (416) 756-0718; Fax (416) 756-0720.



# No other training—in school, on the job, anywhere—shows you how to troubleshoot and service computers like NRI

## HARD DISK

20 megabyte hard disk drive you install internally for greater data storage capacity and data access speed.

## PACKARD BELL COMPUTER

NEC V40 dual speed (4.77 MHz / 8 MHz) CPU, 640K RAM, 360K double-sided disk drive.

## MONITOR

High-resolution, non-glare, 12" TTL monochrome monitor with tilt and swivel base.

## DIGITAL MULTIMETER

Professional test instrument for quick and easy measurements.

## LESSONS

Clearcut, illustrated texts build your understanding of computers step by step.

## SOFTWARE

Including MS-DOS, GW BASIC, word processing, database and spreadsheet programs.

## TECHNICAL MANUALS

With professional programs and complete specs on Packard Bell computer.

## DISCOVERY LAB

Complete breadboarding system to let you design and modify circuits, diagnose and repair faults.

## DIGITAL LOGIC PROBE

Simplifies analyzing digital circuit operation.

Only NRI walks you through the step-by-step assembly of a powerful XT-compatible computer system you keep—giving you the hands-on experience you need to work with, troubleshoot, and service all of today's most widely used computer systems. You get all it takes to start a money-making career, even a business of your own in computer service.

No doubt about it: The best way to learn to service computers is to actually build a state-of-the-art computer from the keyboard on up. As you put the machine together, performing key tests and demonstrations at each stage of assembly, you see for yourself how each part of it works, what can go wrong, and how you can fix it.

Only NRI—the leader in career-building, at-home electronics training for 75 years—gives you such practical, real-world computer servicing experience. Indeed, no other training—in school, on the job, *anywhere*—shows you how to troubleshoot and service computers like NRI.

**You get in-demand computer servicing skills as you train with your own XT-compatible system—now with 20 meg hard drive**

With NRI's exclusive hands-on training, you actually build and keep the powerful new Packard Bell VX588 PC/XT compatible computer, complete with 640K RAM and 20 meg hard disk drive.

You start by assembling and testing the "intelligent" keyboard, move on to test the circuitry on the main logic board, install the power supply and 5 1/4" disk drive, then interface your high-resolution monitor. But that's not all.

**Only NRI gives you a top-rated micro with complete training built into the assembly process**

Your NRI hands-on training continues as you install the powerful 20 megabyte hard disk drive—today's most wanted computer peripheral—included in your course to dramatically increase your computer's storage capacity while giving you lightning-quick data access.

Having fully assembled your Packard Bell VX588, you take it through a complete series of diagnostic tests, mastering professional computer servicing techniques as you take command of the full power of the VX588's high-speed V40 microprocessor.

In no time at all, you have the confidence and the know-how to work with, troubleshoot, and service every computer on the market today. Indeed you have what it takes to step into a full-time, money-making career as an industry technician, even start a computer service business of your own.

**No experience needed, NRI builds it in**

You need no previous experience in computers or electronics to succeed with NRI. You start with the basics, following easy-to-read instructions and diagrams, quickly

moving from the fundamentals to sophisticated computer servicing techniques. Step by easy step, you get the kind of practical hands-on experience that makes you uniquely prepared to take advantage of every opportunity in today's top-growth field of computer service.

What's more—you learn at your own pace in your own home. No classroom pressures, no night school, no need to quit your present job until you're ready to make your move. And all throughout

your training, you have the full support of your personal NRI instructor and the NRI technical staff always ready to answer your questions and give you help whenever you need it.

**Your FREE NRI catalog tells more**

Send today for your free full-color catalog describing every aspect of NRI's innovative computer training, as well as hands-on training in robotics, video/ audio servicing, electronic music technology, security electronics, data communications, and other growing high-tech career fields.

If the coupon is missing, write to NRI School of Electronics, McGraw-Hill Continuing Education Center, 330 Progress Avenue, Scarborough, Ontario M1P 2Z5.

PC/XT and XT are registered trademarks of International Business Machines Corporation

**NRI School of Electronics**



McGraw-Hill Continuing Education Center  
330 Progress Avenue, Scarborough, Ontario M1P 2Z5.

☒ Check one FREE catalog only

- |  |  |
|--|--|
| <input type="checkbox"/> Computers and Microprocessors | <input type="checkbox"/> Security Electronics        |
| <input type="checkbox"/> Robotics                      | <input type="checkbox"/> Electronic Music Technology |
| <input type="checkbox"/> TV/Video/Audio Servicing      | <input type="checkbox"/> Basic Electronics           |
| <input type="checkbox"/> Computer Programming          | <input type="checkbox"/> Data Communications         |

Name (please print) Age

Address Telephone

City/Prov./Code 11-109

Member of Private Career Education Council



# Stabilized Power Supplies Part 2

Looking at the hardware required to implement fix and variable regulators.

STEVE KNIGHT

Last month we gave a general overall survey of regulated power supplies and saw how the circuitry consists essentially of an automatic series control element which, in turn, is protected against overload by feedback control.

This month we look at a series of circuit systems which start with the simple Zener diode stabilizer and build up to hints and tips on the full blooded regulators available for fixed voltage applications in convenient integrated circuit form.

## Zener Stabilizer

The Zener stabilizer is the most basic of all regulators. A Zener diode is essentially identical with the ordinary p-n junction diode, but is designed to operate continuously in the reverse-bias condition beyond the point at which reverse breakdown occurs; see Fig. 2.1.

In an ordinary diode, great care has to be taken to ensure that the applied reverse voltage never gets close to, let alone exceeds, the breakdown point. If it does and the condition is not immediately rectified, a very large reverse current will flow and the diode will burn itself out before you can say "Eek!" or words to that effect.

Zeners, on the other hand, are deliberately operated with an applied reverse voltage which is greater than the breakdown, but with the proviso that the current through the junction is kept within bounds by the use of a resistance in series with the junction. Without such a limiter, the Zener will go the way of all flesh in a remarkably short space of time.

The Zener voltage is usually marked on the body of the device; this can range from about 2.5V up to 200V. The values are marked off in the usual "preferred" series: 2.7, 3.0, 3.3V and so on, and in general have a tolerance of plus or minus 5%.

The cathode end of the Zener, like ordinary diodes, is marked with a coloured band (and sometimes a "k" on circuit diagrams). Zeners also come in a range of power ratings, typically 400 or 500mW, 1.3W, 5W, 1.3W, 5W, and 20W.

The basic Zener stabilizer circuit is shown in Fig. 2.2 where the essential components are resistor R and Zener diode Z. Notice that the diode has its cathode (k) connected to the positive rail. The transformer T1, bridge rectifier REC1 and reservoir capacitor C are components common to most power supplies and are not our particular concern here.

At the particular voltage for which it has been designed, the Zener diode Z will

E&TT November 1989



break down and thereafter, as Fig.2.1 shows, the voltage across the junction will remain substantially constant, irrespective of the (reverse) current flowing through it. This reverse flow is limited to a safe value by resistor R and, providing the applied voltage  $V_s$  does not drop below the breakdown level  $V_b$ , the Zener behaves as a current reservoir.

Referring to Fig. 2.2, it is not difficult to understand how the diode provides a constant output voltage  $V_o$  at terminals A and B in spite of variations in either the input voltage  $V_s$  or in the load current  $I_o$  flowing through  $R_L$ . Suppose the input voltage across C increases for some reason, then the current through the Zener increases but as the voltage across it remains constant, the increase in voltage appears across R.

If the input voltage falls, the Zener surrenders the extra current and the voltage across R also falls. In either situation, the input variation is absorbed by resistor R and the output voltage is unaffected.

Suppose now the load current  $I_o$  increases for some reason. The Zener current will decrease by the same amount. Likewise, if the load current decreases, the Zener current will increase by the same amount. This time the Zener takes up the excess current and sheds the current difference required by the load, so acting as a current reservoir.

## Zener Selection

Whenever you plan to use such a simple system (which is nevertheless sufficient and practical for quite a number of projects requiring a stable supply) a number of points have to be taken into consideration. We will illustrate with some typical figures.

First, choose the Zener diode to suit the output voltage you want. For a 9V supply, you will use a 9.1V Zener, or two 4.7V types in series will do.

Then you will need to know what power rating is necessary. A 500mW (0.5W) Zener rated at 9.1V will be dissipating its maximum permissible power when the current through it is 0.5/9.1A, or 55mA. Remember,  $W = V \times I$ . Hence, under no circumstances must the Zener current  $I_z$  exceed 55mA.

If you look at Fig. 2.2 again, the greatest Zener current flow will occur when the load  $R_L$  is removed; hence from a knowledge of what voltage you have across capacitor C, you can calculate the value of the series resistor R so that it is impossible for a current greater than 55mA to flow.

E&TT November 1989

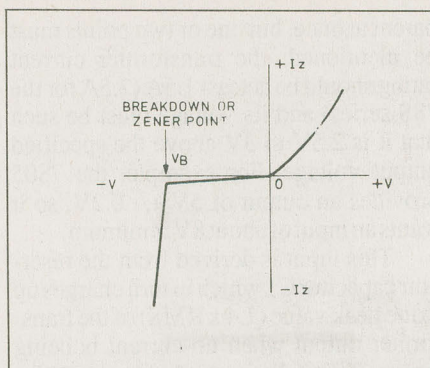


Fig. 1. Zener diode characteristics.

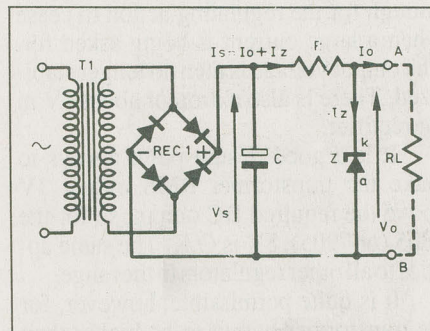


Fig. 2.2. The basic Zener regulator circuit diagram.

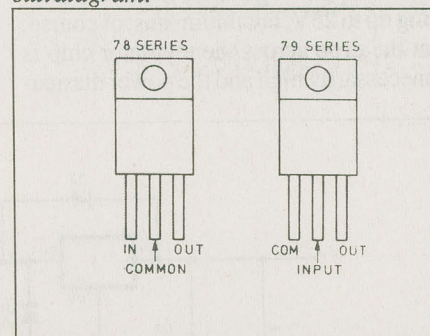


Fig. 2.3. Pinout connections for TO220 style 78/79 series regulators.

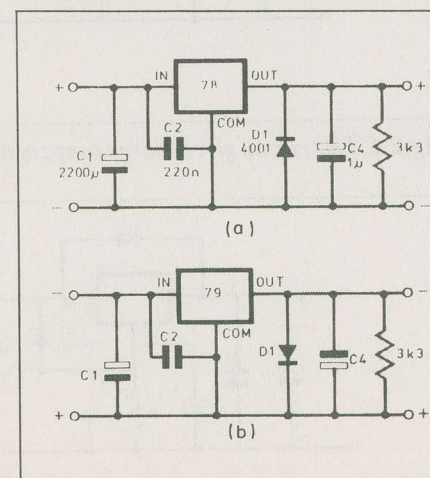


Fig. 2.4. Basic circuit diagrams for the positive 78 series and the negative 79 series.

Suppose the input DC voltage across C is 15V; this voltage, of course, must always be greater than the output. Then to restrict  $I$  to 55mA, we can calculate resistor R to be  $(15-9.1)/55 \times 10 = 107$  ohms.

This is not a preferred value, so to play safe we go to a higher value (not lower) and choose 120 ohms. This value will restrict our maximum Zener current to 50mA whatever happens.

Now, when the load ( $R_L$ ) is connected, current  $I_o$  will flow into it and current  $I_z$  will fall. If  $I_z$  falls too far (typically below a milliamp or so) the Zener action ceases because the diode is no longer in its breakdown region. We must never allow the load to draw so much current that the Zener is starved; it won't be damaged by this but it won't be doing its job either.

The greatest permissible load current is therefore  $I_s - I_z(\text{minimum})$ . In our example above, this would reasonably be 45mA. Always be generous with tolerances; never work things on their theoretical edges.

So with this circuit we could draw any current from zero to about 45mA and the voltage would remain almost (but not quite) constant at 9.1V. The slight variation occurs because the breakdown characteristic is not precisely a vertical line but exhibits a slight slope which is the same thing as saying the Zener has an internal resistance.

Zener diodes rated at 5W and above are usually bolted to suitable heatsinks; 0.5W and 1.3W types can generally go directly on to circuit boards without any additional heat precautions other than that provided by the board copper itself.

## Fixed Voltage Regulators

Getting away from the simple Zener diode, the easiest way to build a stabilized power supply — provided you don't want to vary the output voltage — is to use one or more of the many integrated regulators now available at prices ranging from fifty pence to a few pounds. Most of these regulators are housed in three-terminal TO220 or TO3 packages.

The voltage ranges available cover most common applications; 5V for TTL logic systems and 12V to 24V for CMOS and operational amplifier projects. These regulators contain up to 20 transistors, two reference diodes and 20 resistors and are available in both positive and negative output polarities.

The popular 78L and 79L series are housed in plastic TO92 style cases and are made for low power applications where



## Stabilized Power Supplies, Part 2

the device is mounted directly onto a printed circuit board and there is normally no need for heatsinking. The maximum current rating for this series is 100mA and this is sufficient for most small project supplies.

The 78 and 79 series proper are housed in plastic TO220 packages and are used where greater output currents are required. The standard rating for the basic range is 1A, but the 78S and the 78T series provide outputs of 2A and 3A respectively. All types feature internal limiting and overload protection.

The pin connections for these regulators are shown in Fig. 2.3; in all cases the heatsink surface is connected to the centre pin. When bolted to a heatsink, the usual insulated mounting must be used as for a power transistor.

Although apart from the transformer and reservoir capacitor, the whole of regulated power supply is neatly built into the IC, a few precautions are necessary whenever these devices are put to use. As mentioned above, both positive and negative polarities are available, the 78 series for positive and the 79 series for negative. Basic circuits for both types are shown in Fig. 2.4(a) and Fig. 2.4(b) respectively.

The simplicity of these circuits is ap-

parent at once, but one or two points must be mentioned: the transformer current rating should be at least 1.5A (2.5A for the 78S series) and its voltage must be such that it is 2.5V to 3V above the specified output voltage. For example, the 7805 provides an output of 5V  $\pm$  0.2V, so it wants an input of about 8V minimum.

This input is derived from the reservoir capacitor C1 which in turn charges up to the peak value ( $1.4 \times \text{RMS}$ ) of the transformer output when no current is being drawn. This falls as the load current increases and it is possible for it to drop far enough for the regulating action to cease when a large current is being asked for. The output voltage is then no longer stabilized. There is also a drop of about 1V in the rectifier.

It is a good design point always to make the transformer RMS output 3V above the required DC output, so for the 7805 (or 7905), 8V is O.K. The same applies to all other regulators in the range.

It is quite permissible, however, for the transformer output to be higher than that giving a 3V differential relative to the stated output. In general, it may be anything up to 25V, but this means, of course, that the drop across the regulator chip is unnecessarily high and the power dissipa-

tion is consequently greater for a given current level.

### Ripple Rating

Another point to watch is the ripple rating of C1; this must be at least 1A for the 78/79 series or 2A for the 78S series. If you can make it 50 per cent higher, so much the better.

The 220nF capacitor C2 should be placed as close to the relevant package pins as possible, not wired simply in parallel with C1. Its job is to prevent any self-oscillation and reduce noise.

On the output side there is nothing to be gained by making C4 greater than 10 $\mu$ F; a solid tantalum should be used in preference to an ordinary electrolytic. The diode D1 (a 1N4001 is suitable) protects the regulator against reverse voltages being applied at the output terminals. This might seem an unlikely event, but inductive devices in the connected circuitry can produce reverse voltage spikes at switch-off; capacitor C4 discharging suddenly into a short-circuit can also generate a short term negative voltage.

It is the writer's experience that these integrated regulators are very sensitive to reverse voltages. They are also sometimes sensitive to short-circuits on the output,

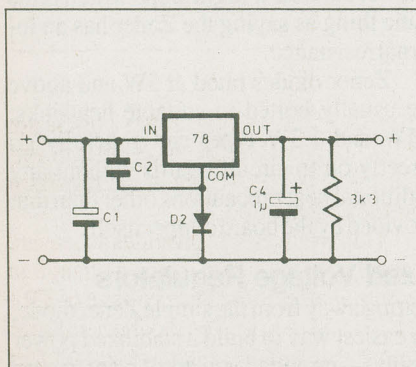


Fig. 2.5. The addition of diode D2, typically a 1N4148, gives a small increase in output.

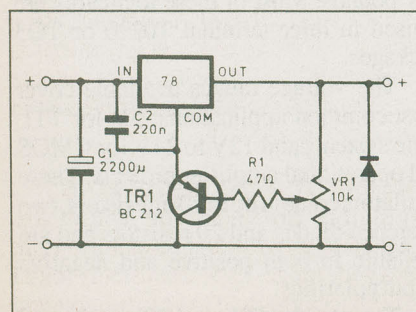


Fig. 2.7. Circuit diagram for improved regulation.

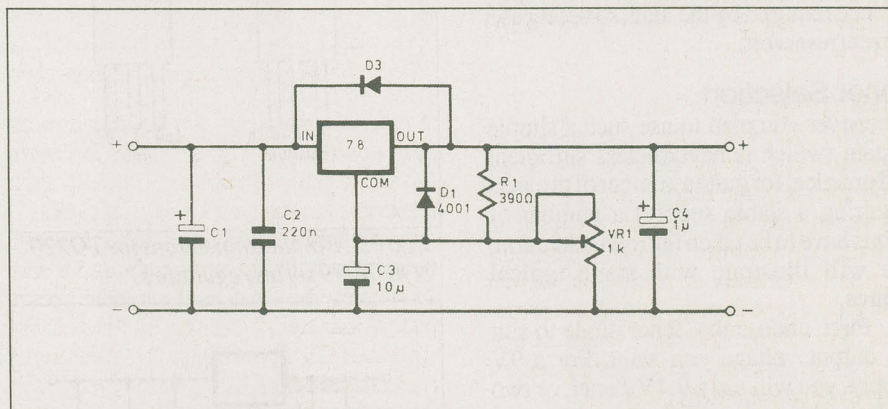


Fig. 2.6. This circuit gives a large range of output voltages.

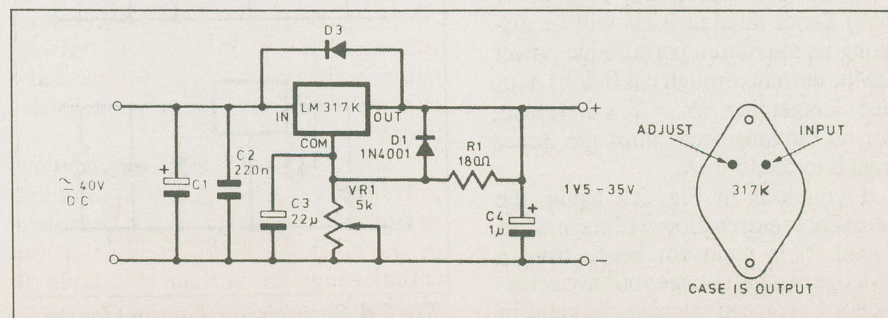


Fig. 2.8. Practical circuit diagram for variable voltage output. Note that an insulating kit should be used for mounting the regulator IC.







## Stabilized Power Supplies, Part 2

providing an output adjustable from about 1.5V to 36V at 1.5A, and the 338 providing a similar output range at a current of 5A.

A basic practical circuit for the 317K is shown in Fig. 2.8 and is similar to that shown in Fig. 2.6 but with the values for

R1 and VR1 being 180 ohms and 5000 (5k) respectively. The range covered is from about 1.5V to 35V at a current maximum of about 1.5A, and this makes a useful variable stabilized supply for experimen-

tal work.

It is possible to get down to zero volts output by providing a negative supply, but we will come to this aspect in due course. A 2°C/W heatsink is necessary; a piece of 14-gauge blackened aluminium 150mm by 100mm is suitable.

By using a 338K regulator, an output of about 1.5V to 25V at a current of 5A can be obtained using the circuit of Fig. 2.9. Here again the basic arrangement is similar to Fig. 2.8 but a switching system is introduced to break the output into two ranges: 1.5V to 15V and 15V to 25V.

The purpose of this range switching is to avoid excessive power dissipation in the regulator which would come about if large currents were being drawn at low output voltages. For instance, suppose the transformer provides a single output winding of 25V RMS.; this appears across the reservoir capacitor C1 as about 30V DC on average.

If the output is set to, say 5V, then there is a drop across the 338K of 25V which, at a current of 5A, represents a dissipation of 125W. This would call for a massive heatsink. By restricting the transformer output to 16V or thereabouts on an output range of 1.5V to 15V, low voltage output levels, even at 5A current, lead to a much lower internal dissipation.

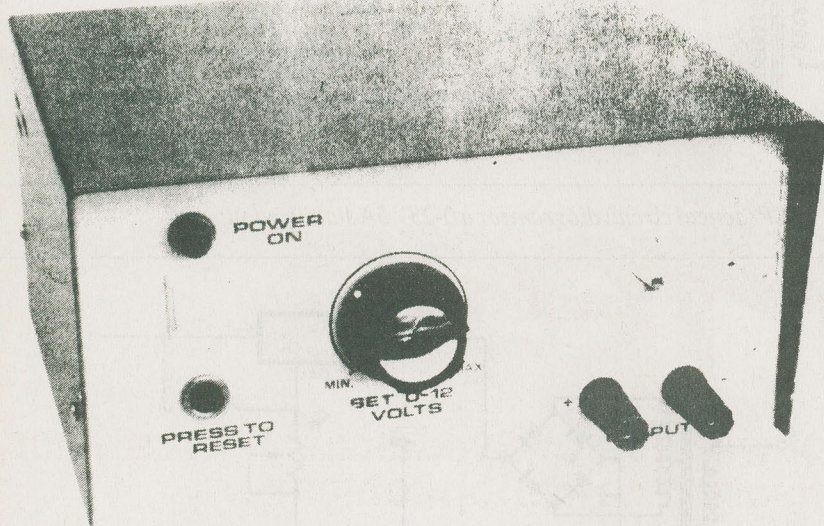
### Getting Down to Zero

It is not usually inconvenient that the outputs of the circuits discussed above do not go down to zero, but if you are a purist who likes to see a complete range coverage on your power supply, a simple modification will put things right. The circuit arrangement to achieve this is shown in Fig. 2.10.

A small additional winding on the transformer of about 6V RMS is rectified by a single diode D4 and smoothed by capacitor C5. The current requirement is very small and a 470 uF capacitor is adequate. This then connects to the circuit systems of either Fig. 2.8 or Fig. 2.9; only the relevant connections are shown.

A 3V Zener diode D5 is suitable for this circuit, but the value of resistor R may need adjustment depending upon the actual d.c. level you get from the rectifier. The notes at the beginning of this article should enable you to do this without difficulty.

A 3V Zener diode D5 is suitable for this circuit, but the value of resistor R may need adjustment depending upon the actual DC level you get from the rectifier. The notes at the beginning of this article should enable you to do this without difficulty.



## NEW FROM ATLAS

B&K-Precision, exclusively represented in Canada by Atlas Electronics Limited, has introduced these new products:



### 50,000 OHMS/VOLT MULTIMETER

The Model 214 VOM features 50,000 Ohms/Volt DC, 37 ranges, and 4 1/2 inch mirrored scale. It is diode and High-energy fuse protected and offers an operating range of 0-50 degrees Celsius. A tilt stand, handle, batteries and test leads are included.



### 20,000 OHMS/VOLT MULTIMETER

The cost effective Model 114 Volt Multimeter offers 24 ranges, 20,000 Ohms/Volt DC, and 3 1/2 inch mirrored scale. This compact, easily hand-held size unit includes batteries and test leads.



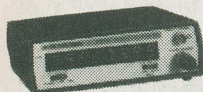
### VIDEO DISPLAY RESTORER/ANALYZER

The Model 490 Video Display Restorer/Analyzer tests and restores video display tubes in minutes — on site. This unit is ideal for video, terminal, monitor, and TV CRTs. Exclusive multiplex technique tests all three guns of colour CRT simultaneously under actual operating conditions.



### MODEL 3001 AUDIO GENERATOR

The Model 3001 is a low cost, pocket size, 20 Hz-150kHz-frequency range unit and is ideal for either field service or hobbyist troubleshooting applications. Weighing only 7 ounces, the 3001 offers selectable features at an excellent price.



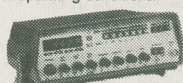
### 550 MHz FREQUENCY COUNTER

The low cost Model 1804 High frequency counter is an ideal counter for users seeking an affordable, general purpose instrument with a high frequency range. Features include a 5Hz to 550 MHz range, 8 digit display, low pass filter, 1 sec. and 0.1 sec. gates and OVERflow indicator.



### 900 SERIES TEMPERATURE METERS

The three 900 series models feature 3 1/2 digit LCD display, and 9 volt battery operation. The Model 920 Dual-Input Digital Temperature Meter has two K-type thermocouple sensor probes, the Model 910 features a single K-type thermocouple sensor probe, and the compact, probe-type Model 900 features selectable internal or external operation.



### 5 MHz SWEEP/FUNCTION GENERATOR

The Model 3026, 5 MHz Sweep/Function Generator offers 5 digit LED frequency display. It is a highly versatile signal source that is able to generate sine, square, triangle, ramp, pulse, and TTL pulse outputs. The new streamlined black case gives the 3026 a high tech look.



### 1201 TELEVISION FREQUENCY CONVERTER/MODULATOR

The 1201RS will convert TV or video signals to virtually any TV or CATV channel and is designed for testing on broadcast television and CATV channels and generating close-circuit MATV signals. It is both a diagnostic aid and program source and operates on all VHF broadcast and cable frequencies from 0 to 70.

For additional information, contact:  
**ATLAS ELECTRONICS LIMITED**

50 Wingold Avenue, Toronto, Ontario M6B 1P7 Tel. (416) 789-7761 Fax (416) 789-3053



# Ventura VS XPress

Mac and PC Publishing software has evolved along different lines.  
Here's a comparison of the two top contenders.

RODPOTTER

Anyone on the verge of purchasing their way into desktop publishing will probably choose either a PC- or Macintosh-based system. The hardware differences between these two systems have been well documented, but apart from numerous, time-worn clichés, very little has been said about their software differences.

In this article, we'll compare and contrast Ventura Publisher and Quark XPress, the two kingpins of desktop publishing for the Mac and the PC, respectively. If you're looking for a publishing system, these are two you'll certainly want to consider. If you're already using one of them, you may be interested to see just how the other half lives.

## Basic Philosophies

Ventura and Quark XPress are based on radically different philosophies. In Ventura, the text of a document is treated as a collection of paragraphs. Formatting the text is a matter of classifying each paragraph by *tagging* it with an appropriate style. (Paragraphs not otherwise tagged default to the "body text" style.) After the paragraphs in a document have been tagged, you can easily modify the entire document by adjusting the attributes of the paragraph tags. This object-oriented approach has proven to be an efficient way to format very large documents.

Quark XPress documents, on the other hand, are treated like paintings. By selecting and highlighting individual letters, words and paragraphs, you apply specific typographical characteristics such as font and size. Quark's approach gives you absolute control over every character by allowing you to *paint* it until it looks right. After the right look has been achieved, you can preserve it by saving the document as a template.

There are advantages to both of these approaches. And both Quark XPress and Ventura borrow from each other. For instance, you can change the type styles of individual letters and words in Ventura and you can create style "tags" in Quark that can be applied to paragraphs within a document. In general, however, you'll find that the menu and screen design and the keyboard shortcuts available to the two programs make it easier to tag paragraphs in Ventura and paint text in Quark.

## Frames

In Quark, text is always placed in text boxes, while graphics are placed in picture boxes.

Unlike Ventura frames, Quark text and graphics boxes obey some strict child-parent rules. When one box is placed inside another, the smaller box becomes structurally linked with the larger one. If you move or delete the larger box, the

smaller box — and all of its contents — will also be altered.

More importantly, the size of the smaller box cannot exceed the dimensions of its parent. Unless you plan your document properly, these rules can lead to some awkward situations. For instance, before you can decrease the size of a text box, you may have to resize all its inner elements.

## Painting Text

In Quark XPress, you select text by dragging the mouse while holding down the mouse button until the text you want to change has been highlighted.

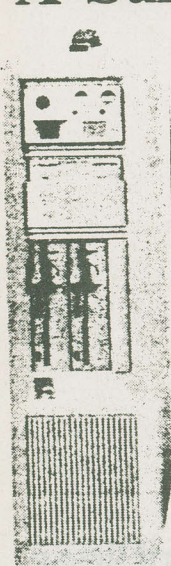
After selecting a block of text, you can change any of its typographic characteristics. You can use the mouse to access font, size, leading and alignment and tab menus, but Quark also provides a host of keyboard shortcuts for these functions. Pressing *Command-Shift->*, for example, increases the point size of all selected text by one point. As you might expect, pressing *Command-Shift-<* shrinks the selected type by one point.

In Ventura, it is also possible to use the mouse to select and modify text. In text mode, a list of standard type attributes is displayed on the left side of the screen. After highlighting a block of text, you can select bold, italics, underlining,



# A Sure Winner: Plays The Right Cards

**Pick the Card That Gives You All The Advantages**



**THE BLAZING ORION 386**  
**A♥ 25MHz CACHE 386**  
**TAKES YOU TO THE LIMIT**

SAVE SPEEDS AS SYSTEM 386  
BUT WITH OUR 25MHz CACHE 386 MB  
32 KB CACHE AUTO BOOTING ROM  
8 KB SOCKET FOR 80387-25  
8 EXPANSION SLOTS  
DMA VER 4.0 DRIVER  
I/O CACHE UTILITY DIAGNOSTIC PROG.  
FULLY COMP WITH MS DOS;  
OS/2; UNIX; CONCURRENT DOS 386;  
PC DOS/386; XENIX; ETC;

**\$2,999**

**ORION 386**  
**K♥**

8 EXPANSION SLOTS  
TURBO 8/20 MHz  
INTEL 80386-20 CPU  
1MB RAM EXP 4/8 MB  
1.2 MB OR 1.4 MB DRIVE  
FLOPPY/HARD DISK CONT.  
SER/PAR/GAME/CLOCK  
AT 101 ENHANCED KEYBOARD  
COLOR OR MONO VIDEO CARD  
ASSEMBLED & FULLY TESTED  
IN CANADA  
100% IBM COMPATIBILITY

**\$1,699**

386-25...\$1,899

**ORION 386 SX**  
**Q♥**

8 EXPANSION SLOTS  
INTEL 80386 SX CPU  
TURBO 8/16 MHz  
1MB RAM EXP TO 4/8 MB  
1.2 MB OR 1.4 MB DRIVE  
FLOPPY/HARD DISK CONT.  
SER/PAR/GAME/CLOCK  
AT 101 ENHANCED KEYBOARD  
COLOR OR MONO VIDEO CARD  
ASSEMBLED & FULLY TESTED  
IN CANADA  
100% IBM COMPATIBILITY

**\$1,499**

**ORION 286**  
**J♥**

8 EXPANSION SLOTS  
TURBO 6/12 MHz  
INTEL 80286 CPU  
1.2 MB OR 1.4 MB DRIVE  
FLOPPY/HARD DISK CONT.  
SER/PAR/GAME/CLOCK  
AT 101 ENHANCED KEYBOARD  
COLOR OR MONO VIDEO CARD  
ASSEMBLED & FULLY TESTED  
IN CANADA  
100% IBM COMPATIBILITY

**\$899**

286-16...\$999

**ORION 88**  
**10♥**

8 EXPANSION SLOTS  
256K RAM  
10 MEG TURBO  
360K OR 720K DRIVE  
SER/PAR/GAME/CLOCK  
MONO/COLOR VIDEO CARD  
AT STYLE CASE & KEYBOARD  
ASSEMBLED & FULLY TESTED  
IN CANADA  
48 HOURS BURN IN  
100% IBM COMPATIBILITY

**\$499**

XT 88-12...\$549

You can't find a better deal than this: With ORION the odds are with you so there's no need to gamble. ORION cards are marked! Marked by superior design; quality manufacturing & loaded with features at prices that will make the competition fold!!! FOR A SURE BET GO WITH ORION

**and compare our quality and prices! Before You Purchase ANY Computer!**

## ORION DISKETTES

100% ERROR FREE & LIFETIME WARRANTY

**KAO-DIDAK**

KAO 5 1/4" DISKS	PER BOX	10 BOXES
MD2D 360K	\$ 8.49	\$ 7.95
MD2H 1.2M	\$11.45	\$10.95
FOR COLOR ADD	\$ 3.00	\$ 2.75
KAO 3 1/2" DISKS	PER BOX	10 BOXES
MF2DD	\$15.95	\$14.95
MF2HD	\$31.95	\$30.95
FOR COLOR ADD	\$ 4.00	\$ 3.75
DISCAROO COLOR IN POUCH	\$22.95	\$19.95

**ORION 5 1/4" DISKS**

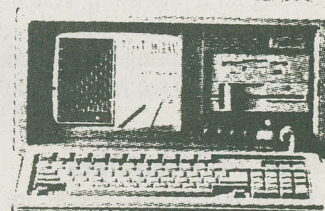
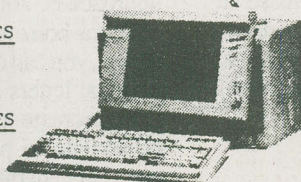
ORION 5 1/4" DISKS	PER BOX	10 BOXES
OD2D 360K	\$ 7.99	\$ 6.99
OD2HD 1.2M	\$10.95	\$10.49
FOR COLOR ADD	\$ 3.00	\$ 2.50
ORION 3 1/2" DISKS	PER BOX	10 BOXES
OF2DD 1 MEG	\$14.95	\$13.95
OF2HD 2 MEG	\$30.95	\$29.95
FOR COLOR ADD	\$ 4.00	\$ 3.50

**SONY**

5 1/4" DSDD 360K....	PER BOX	10 BOXES
W/PLASTIC CASE...	\$10.95	
3 1/2" DSDD 1M.....	PER BOX	10 BOXES
	\$19.95	\$19.45
3 1/2" HD 2M .....	PER BOX	10 BOXES
	\$44.95	\$42.95
5 1/4" HD 1.2M.....	PER BOX	10 BOXES
	\$19.95	\$19.49

**NO NAME DISKETTES**

NO NAME 5 1/4" DISKS	PER BOX	10 BOXES
NN2D 360K	\$ 5.99	\$ 4.99
NN2HD 1.2M	\$ 9.95	\$ 9.45
NO NAME 3 1/2" DISKS	PER BOX	10 BOXES
NNF2DD 1M	\$13.95	\$12.95
NNF2HD 2M	\$29.95	\$28.95



**ORION PORTABLE SYSTEMS**

	88	286	386	386
	256K	512K	1 MEG	25MHz CACHE
9" AMBER DUAL CRT	1,195	1,695	2,495	3,695
9" EGA MONITOR	2,195	2,595	3,395	4,595
LCD 600X400 SCRIN	1,595	1,995	2,795	3,995
PLASMA 600X400 S	2,495	2,895	3,695	4,895

## Quality, Reliability and Service

**MOST ORDERS SHIPPED WITHIN 24 HOURS. SERVING YOU FOR OVER 15 YEARS** If you find a better price call us before you buy.

40 LANCASTER ST., W.  
KITCHENER, ONT. N2H 4S9  
PH: (519) 576-9902  
FAX: (519) 576-9028

WHY WAIT? CALL ORION ELECTRONICS NOW!  
ORDER TOLL FREE  
**1-800-265-2658**

Order desk & technical support open:  
9:00 a.m. to 6:00 p.m. Monday - Friday  
9:00 a.m. to 5:00 p.m. Saturday  
For Service CALL  
1-519-576-9026



## SEAGATE ST-225-20 MB HARD DISK SYSTEM

Includes hard disk controller, cables and instructions. All drives are pre-tested and come with a one year warranty. **\$349**

## Seagate Hard Drives

ST225 KIT, 20MB, 65MS, (MFH).....	\$349.95
ST238R KIT, 30MB, 65MS, (RLI).....	\$389.95
ST251L, 40MB, 28MS, (MFH).....	\$475.95
ST251N, 40MB, 38MS, (SCSI).....	\$599.95
ST4096, 80MB, 28MS, (MFH).....	\$849.95
SEAGATE 3 1/2" DISK DRIVES	
ST125, 20MB, 40MS, (MFH).....	\$375.95
ST138M, 32MB, 40MS, (MFH).....	\$479.95
ST138N, 32MB, 40MS, (SCSI).....	\$529.95
ST138R, 32MB, 40MS, (RLI).....	\$449.95
ST157R, 50MB, 40MS, (RLI).....	\$479.95

## MiniScribe Hard Drives

MINISCRIBE 1 YEAR WARRANTY	
3053 - 5 1/4", 40MB, 25 MS.....	\$575.95
3085 - 5 1/4", 70MB, 22 MS.....	\$799.95
3650 - 5 1/4", 40MB, 61 MS.....	\$399.95
8425 - 3 1/2", 20MB, 68 MS.....	\$325.95
8438 - 3 1/2", 30MB, 68 MS, RAL.....	\$349.95

## STAR HARD CARDS

SC20A, 20MB, 65MS, MH, XT, PS/2, 30 \$495.95	
SC20B, 20MB, 62MS, MH, XT, PS/2, 30 \$475.95	
SC125, 20MB, 40MS, MH, XT, PS/2, 30 \$495.95	
SC30A, 30MB, 65MS, RLL, XT, PS/2, 30 \$599.95	
SC30B, 30MB, 62MS, RLL, XT, PS/2, 30 \$549.95	
SC138M, 30MB, 40MS, MH, XT, PS/2, 30 \$579.95	
SC138R, 30MB, 40MS, RLL, XT, PS/2, 30 \$549.95	

## WESTERN DIGITAL Controller Boards

WESTERN DIGITAL HARD DRIVE CONTROLLERS	
HARD DISK 20 MEG (MFH), XT.....	\$ 79.95
HARD DISK (MFH), XT.....	\$ 84.95
HARD DISK (RLL), XT.....	\$ 84.95
6 - 12MHz, HD (MFH), AT, XT286 \$129.95	
6 - 12MHz, HD/FD (MFH) AT, XT 286 \$139.95	
6 - 12MHz, HD (RLL), AT, XT286 \$165.95	
6 - 12MHz, HD/FD (RLL) AT, XT 286 \$189.95	

\* ALL OF THE ABOVE ARE 2:1 INTERLEAVE \*

16MHz, HARD DISK (MFH) AT, 386 \$169.95

16MHz, HD/FD (MFH) AT, 386.....\$189.95

16MHz, HARD DISK (RLL) AT, 386 \$189.95

16MHz, HD/FD (RLL) AT, 386.....\$199.95

16MHz, HD/FD ESDI INTERFACE AT, 386 \$299.95

\* ALL OF THE ABOVE ARE 1:1 INTERLEAVE \*

## Floppy Controller Boards

AT XT FLOPPY DRIVE CONTROLLER.....\$ 39.95

AT/XT HI DENS 360/1.2/720/1.44 \$ 59.95

WE CARRY A HUGE SELECTION OF HARD DRIVE CONTROLLERS. ASK FOR A COMPLETE LISTING.

## JOYSTICKS

GRAVITY (CAN MADE 1 YR WAR).....\$49.95

GRAVITY (SAME AS ABOVE BUT CLEAR).....\$54.95

IBM COMPATIBLE JOYSTICK FROM.....\$19.95

QUICK SHOT IBM/APPLE.....\$29.95

TJ8101 PHOTO MICRO IBM/APPLE \$34.95

DELUXE JOYSTICK IBM/APPLE.....\$39.95

WINNER 909 IBM/APPLE.....\$34.95

COMPUTER JOYSTICK IBM.....\$29.95

JOYSTICK 606 IBM.....\$32.95

## SCANNERS

HANDYSCANNER 2.5".....\$ 299.95

HANDYSCANNER 4, 1/8".....\$ 349.95

LOGITECH SCANNER 4, 1/8".....\$ 379.95

CAT IMAGE SCANNER.....\$ 299.95

CHINON DESK SCANNER.....\$ 895.95

SHPE DESK SCANNER.....\$1,295.95

## EDIMAX LAN PROFESSIONAL

AL-2350 STAR TOPOLOGY ARC LINK.....\$189.95

AL-2351 BUS TOPOLOGY ARC LINK \$239.95

AH-2355 8 PORT ACTIVE HUB.....\$489.95

AH-2356 4 PORT ARC LINK HUB.....\$479.95

AH-2357 4 PORT PASSIVE HUB.....\$ 39.95

EN-2360 ETHERNET NE-1000 COMP.....\$349.95

TM-500H 50 OHM TERMINATOR.....\$ 8.95

TM-930H 93 OHM TERMINATOR.....\$ 8.95

## Floppy Drives

SONY 3M DATA CARTRIDGES

DC2000.....\$34.95

DC1000.....\$29.95

DC600A.....\$42.95

DC600HC.....\$49.95

DC600XTD.....\$49.95

DC300XLP.....\$48.95

QD600A.....\$39.95

QD2000.....\$29.95

QD300XLP.....\$37.95

QD600XTD.....\$44.95

5 1/4" DRIVES INCLUDE 5 1/4" FRAMES

## Your #1 Source For Quality Computer Components

## TTX MONITORS

1201A - 12" COMP AMBER MONOCH.....	\$129.95
1400F/A 14" TTL AMBER FLAT SCREEN \$179.95	
1452F/W 14" VGA AN WHT FL SCREEN.....	\$199.95
1452F ANALOG/VGA PS2 COMPATIBLE.....	\$199.95
1435 - 12" RGB 640 X 200.....	\$349.95
2410 - 14" RGB 43mm POL.....	\$399.95
2410AG - 14" RGB 43mm A. GL.....	\$475.95
2411 - 14" RGB 39mm POL.....	\$475.95
2411AG - 14" RGB 39mm A. GL.....	\$499.95
2412 - 14" EGA 39mm A. GL.....	\$575.95
2412AG 39 EGA 640 X 350 AG.....	\$499.95
2422 - 14" EGA 31mm A. GL.....	\$599.95
2422AG 39 VGA 640 X 480 AG.....	\$499.95
2431AG 31 VGA 720 X 480 AG.....	\$529.95
3450AG 28mm 1024 X 768 MULTISYNC \$799.95	
3435AG 31mm 800 X 600 MULTISYNC.....	\$749.95

\* ALL TTX MONITORS WITH TILT/SHWEL BASE \*

## DataTrain Monitor

DC200S - 14", 41mm DOT P, RGB T/S.....	\$449.95
DC205S - 14", 52mm DOT P, RGB T/S.....	\$349.95
DC353S - 14", 31mm EGA/CGA/T/S.....	\$549.95
DC355 DOT PITCH 41mm EGA/CGA.....	\$479.95
DC505 DOT PITCH 41mm VGA.....	\$499.95
DC600 M. RES VGA/DIG. D.P. 31mm.....	\$679.95

## DATA TRAIN MONITORS: MONOCHROME

V240A - 12" AMBER COMPOSITE.....	\$139.95
V242 - 12" TTL AMBER OR GREEN.....	\$134.95
V244 - 12" TTL, AMBER.....	\$129.95
V252 - 12" M. RES MONO AMB/GRN.....	\$169.95
V262A - 12" FLAT SCREEN TTL AMBER \$159.95	
V272 - 14" DUAL FREQ AMBER/WHT.....	\$189.95
V282A - 14" FLAT SCR, DUAL FREQ.....	\$169.95
V282W - 14" FLAT SCR, DUAL FREQ.....	\$179.95
V502 - 12" ANLG VGA/MCGA MONO WR.....	\$199.95

## Modems

1200 INTERNAL.....	\$ 89.95
1200 EXTERNAL.....	\$119.95
2400 INTERNAL.....	\$ 89.95
2400 EXTERNAL.....	\$179.95
4800.....	\$399.95
9600.....	\$995.95
ASHER FAX CARD 4800.....	\$499.95
ASHER FAX CARD 9600.....	\$895.95
PANAFAX UF150.....	\$1,595.95
PANAFAX UF250.....	\$2,295.95
PANAFAX UF140.....	\$1,495.95
PANAFAX UF260.....	\$2,499.95
RAVEN RF100.....	\$1,495.95

## MICE

LOGITECH HI RES SERIAL.....	\$ 99.95
LOGITECH HI RES BUS.....	\$109.95
DEKKA 2 BUTTON AT, XT.....	\$ 59.95
DEKKA DELUXE AT, XT.....	\$ 69.95
GENIUS GM-6 PLUS 200 X 800.....	\$ 69.95
GENIUS GM 6000 DELUXE PKGE.....	\$ 89.95
JVC OPTICAL 250-500 DPI.....	\$ 99.95
MOUSE PAD.....	\$ 8.95
MOUSE STAGE.....	\$24.95

## SPECIALTY INDUSTRIAL BOARDS FOR IBM COMPUTERS

SI-7210-C IEEE-488 CARD.....	\$369.95
SI-451P 4 SERIAL 1 PARALLEL.....	\$189.95
SI-851P 8 SERIAL 1 PARALLEL.....	\$249.95
SI-8520-X1 RS422 (PC/XT) 1 PORT.....	\$119.95
SI-8520-X2 RS422 (PC/XT) 2 PORT.....	\$139.95
SI-8520-A1 RS422 (PC/AT) 1 PORT.....	\$139.95
SI-8520-A2 RS422 (PC/AT) 2 PORT.....	\$179.95
SI-4232 CONVERTER RS232C-RS422.....	\$139.95
SI-7541 12 BIT AD/DA CARD.....	\$195.95
SI-8255 8255 I/O CARD.....	\$139.95
SI-2121 COPY BOARD.....	\$139.95
CLK 3200 2 SER/2 PAR FOR XT/AT.....	\$ 69.95
CLK 3200 8 SER PORT PC XT/AT.....	\$379.95
CLK 3300 MULTI USER CARD 4 PORT.....	\$129.95
CLK 3400 RS422 CARD XT/AT.....	\$119.95
CLK 3500 TEE 488 CARD.....	\$329.95
CLK 3600 14 BIT A/D D/A CARD.....	\$329.95
CLK 3700 12 BIT A/D D/A CARD.....	\$199.95
CLK 3800 8255-8253 I/O CARD.....	\$ 99.95

## DATA SWITCH BOX MANUAL

RS232 SWITCH BOX 2 PORT \$29.95	
RS232 SWITCH BOX 4 PORT \$39.95	
CENTRONICS S/BX 2 PORT \$35.95	
CENTRONICS S/BX 4 PORT \$45.95	
SENDON UPS	
UPS-250 XT OR SMALL AT.....	\$475.95
UPS-400 FOR FULL SIZE AT.....	\$599.95
UPS-400 NO AVR.....	\$575.95
UPS-800 FOR 386.....	\$975.95
WITH NOVELL HOOK-UP \$999.95	

## GENDER CHANGERS

25/15/9 M/M OR F/F.....	\$ 8.95
25-9 M/M OR F/F.....	\$ 8.95
JUMPERBOX DB25M/F.....	\$ 9.95
NUL MOD.....	\$13.95
RS232 MINI TESTER W/F.....	\$12.50
WIRING BOX DB25M/F.....	\$12.50
RS232 REVERSE.....	\$12.50
SRG PROTECTOR DB25M/F.....	\$14.95
RS232 BREAKOUT BOX.....	\$69.95
MLP20 LOGIC MONITOR.....	\$69.95

## Roland

PR9101 9-PIN 192 CPS DESKTOP.....	\$ 279.95
PR9104 9-PIN 240 CPS DESKTOP.....	\$ 349.95
PR2417 24-PIN DESKTOP.....	\$ 499.95
ROLAND DG PRINTERS	
PR1212A 216 CPS DOT MATRIX.....	\$ 475.95
PR1250 288 CPS DOT MATRIX.....	\$ 549.95
PR1215 216 CPS WIDE CARRIAGE.....	\$ 649.95
PR1550 288 CPS WIDE CARRIAGE.....	\$ 799.95
PR2450 240 CPS WIDE CARRIAGE.....	\$ 999.95
PR2017 17 CFA DAISY WHEEL.....	\$ 449.95

## ROLAND LASER PRINTERS

LP1100 11 PG/MIN SIZE.....	\$2,795.95
ROLAND FLATBED PLOTTERS	
EX1100 A/B SIZE 8-PIN HP COMP.....	\$1,299.95
EX1200 A/B SIZE ELECTROSTATIC.....	\$1,795.95
DX1300 A/B SIZE 1 MB BUFF STD.....	\$2,295.95
DX1200 C-SIZE PEN LOGIC.....	\$5,985.95
DPX3300 D-SIZE FLATBED PLOT.....	\$7,495.95
ROLAND ROLLERBED PLOTTERS	
GRX300 D-SIZE ROLLERBED.....	\$5,495.95
GRX300M D-SIZE 1 MB RAM.....	\$5,985.95
GRX400 E-SIZE ROLLERBED.....	\$6,495.95
GRX400M E-SIZE 1 MB RAM.....	\$7,495.95

## MANNESMANN TALLY

MT81 9-PIN 130 CPS.....	\$ 249.95
MT222 24-PIN 220 CPS.....	\$ 729.95
MT230-24 WIDE 300/150/100/75.....	\$1,795.95
MT230-9 WIDE 300/150/100 9-PIN.....	\$1,395.95
MT905 LASER (HP SERIES II COMP).....	\$1,899.95
1 MEG EXPANSION.....	\$ 499.95

## Panasonic PRINTERS

EXP1180 11 192 CPS 9-PIN.....	\$ 299.95
EXP1191 11 240 CPS 9-PIN.....	\$ 375.95
EXP1124 11 192 CPS 24-PIN.....	\$ 549.95
EXP1524 16.5 240 CPS 24-PIN.....	\$ 999.95
EXP4450 11 PPM LASER PRINTER.....	\$2,795.95

## EPSON A Printer For Any Application

### 24-PIN LETTER QUALITY DOT MATRIX PRINTERS

LQ-1050 264/220/88/73 CPS.....	\$1,095.95
LQ-2500 270/90 CPS DRAFT/NLQ.....	\$1,295.95
LQ-500 180/60 CPS.....	\$ 429.95
LQ-510 180 CPS.....	\$ 529.95
LQ-850 264/220/88/73 CPS.....	\$ 895.95
LQ-950 24 PIN 2 X 12 DOT MATRIX.....	\$ 999.95
50-2500 540/120 INK JET 132 COL.....	\$1,495.95

LX-800 180/150 CPS.....	\$ 249.95
LX-810 180 CPS.....	\$ 299.95
EX-800 250/45 CPS.....	\$ 699.95
FX-1050 264/54 CPS.....	\$ 799.95
FX-850 265/54 CPS SMARTPARK.....	\$ 599.95
FX-86E 200/40 CPS 80 CLMN.....	\$ 499.95
DFX EPSON 533 CPS.....	\$2,895.95
JX-80 COLOR PRINTER.....	\$ 499.95

## star PRINTERS

NX 1000 144/36 CPS.....	\$ 269.95
NX 1000C 144/36 CPS.....	\$ 289.95
NX 1000C 144/36 CPS (7 COLOR).....	\$ 375.95
NX 1000 144/36 CPS (7 COLOR).....	\$ 375.95
NX 15, 120/30 CPS NLQ.....	\$ 549.95
XR 1000 300/76 CPS NLQ.....	\$ 595.95
XR 1500 300/76 CPS NLQ.....	\$ 799.95
NX 2400 170/57 CPS NLQ, 24 PIN.....	\$ 499.95

## AEG OLYMPIA

NP 136-24 24 PIN 240 CPS COL \$ 749.95

NP 136-24 24 PIN 240 CPS.....\$ 699.95

## Program Card for IBM-PC/XT/AT

BW-601 BIPOlar FROM PROG. CARD.....	\$399.95
EW-701 EPROM WRITER 2716-1024.....	\$299.95
EW-704 EPROM WRITER 2716-1024.....	\$349.95
EW-901 EPROM WRITER XT/AT 2716-512.....	\$249.95
EW-904 EPROM WRITER XT/AT 2716-512.....	\$325.95
PAP-01 PAL PROGRAMMER.....	\$399.95
BPP-01 BPPROM PROGRAMMER.....	\$399.95
BU-2017 EPROM U. V. ERASER.....	\$149.95

## INTERFACE CONVERTER

SMITH CORONA SERIAL-PARALLEL.....	\$ 49.95
PS-100 SER-PAR, EXT POWERED.....	\$ 89.95
PS-100 SER-PAR, EXT POWERED.....	\$ 89.95
SP-200 SER-PAR, INTERFACE POW.....	\$ 79.95
PS-200 PAR-SER, INTERFACE POW.....	\$ 79.95
RR-100 RS232C/RS422A CONVERT.....	\$ 69.95
IC-11 RS232C/RS485 CONVERTER.....	\$ 99.95
IC-12 RS232C/CURRENT LOOP CON.....	\$ 99.95

## MOTHER BOARDS

XT 8MHz TURBO MB OK.....	\$ 99.95
--------------------------	----------



# Quark vs. Ventura

capitalization, and other attributes.

However, to change the point size of the highlighted type you must access the Select Font dialog box, by clicking on its name in the "sidebar" control area of the screen.

Although Ventura lacks many of the keyboard shortcuts offered by Quark, you can always access the most recently used pulldown menu by pressing Control-X. This is an extremely useful shortcut that lets you quickly jump between a menu and the document.

Quark goes a step further by eliminating the need to jump back and forth between menus and the document. Almost all of Quark's menus have an *Apply* option that lets you see the effects of the current setting without actually exiting from the menu box.

## Keeping Tabs

Both Quark and Ventura support sophisticated tab control.

In Ventura you specify the position of each tab stop from a menu. In Quark's tab mode, a tab ruler appears above a marked text block. By clicking the mouse over the text ruler you can easily place and adjust tabs. As in Ventura, you can also specify tabs to be left, center, right or decimal aligned.

## Style Sheets

Although both Quark and Ventura support something called "style sheets", on closer inspection you'll find that the two programs handle style sheets quite differently.

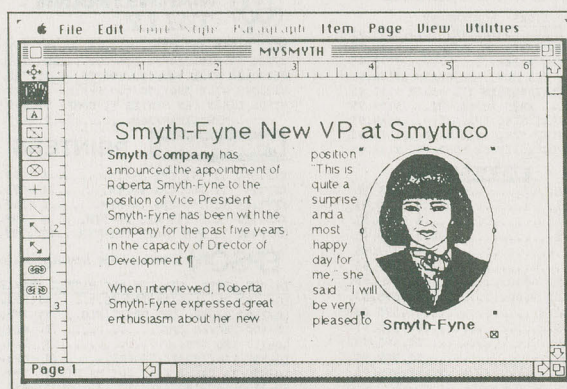
Some of the typographic attributes that are stored in Ventura style sheets are either not available — or not applicable — to Quark XPress. In both Quark and Ventura, style tags can be used to determine how a paragraph will be aligned. Both programs let you specify left, centered, right and justified text. However, Ventura adds considerably more control by allowing the user to align text to either a frame or a column. This feature makes it possible to align headlines and display type to a wide frame, while aligning body copy and subheads to the frame's column guidelines.

In Quark, on the other hand, all text is automatically aligned to the column guidelines within a text box. This means that a headline must be placed in a separate text box above the body copy in order to align it across the width of the entire page. In a complex document, you'll spend extra time creating headline text boxes and cutting the headlines out of the body

copy and pasting them into their appropriate boxes.

Other style attributes available to Ventura Publisher include boxed text and ruling lines above and below. You can specify up to three rules above and below any paragraph. You can also create boxed paragraphs.

These features can be duplicated in Quark XPress by drawing horizontal and vertical rules and frames, but these elements may have to be repositioned when text is added or removed from a document. This is not the case in Ventura, where paragraphs are treated as dynamically linked objects. When you insert, remove or adjust one paragraph, all other paragraphs in the document will be repositioned automatically.



tioned automatically.

So, Ventura paragraph tags *do more* than Quark tags. To compensate, Quark makes it possible to save standard document layouts as master *Templates*. These templates can contain the pre-positioned text boxes, headers and footers and other elements needed to create a particular document. Within a text frame, you can specify the number of columns and assign a default type font, size and style. This approach makes Quark XPress an efficient tool for producing forms and other documents where the layout and typography are constant from one edition to the next.

In Ventura, all of the typographic elements (and a number of graphical elements such as rules and boxes) can be easily standardized by taking advantage of the program's style sheet capabilities. Although Ventura does not explicitly provide document templates with predefined frames, columns, headers and footers, most Ventura users have from the beginning learned to save "master" versions of their standard documents. This is simply a matter of saving an existing document as a new file and removing its body copy, illustrations and any other ele-

ments that change each time the document is prepared.

## Text Wrap

"Wrapping" text around a graphic element can be one of the more time-consuming operations in desktop publishing. Quark handles such text wraps much more elegantly than Ventura.

Text wraps automatically and "intelligently" in Quark; you need only place the graphic where you want it.

In Ventura, you must "push back" the text away from the graphic, by defining small transparent frames over top of the graphic itself. This can be a laborious procedure. With a complex graphic, the number of frames required can be very large, and the results are occasionally unpredictable when the configuration of frames becomes very complex. Generally, you can get any results you want with Ventura; however, we'd be surprised if automatic text wrap were missing from the next release of the software.

## Output

Quark does have more advanced printing, in some ways. For example, it provides complete control over how to "tile" output that must be broken up over several printer pages. Because of Quark's sophisticated tiling facility, working with oversized documents is easier. You can lay out full-size versions and print selected chunks so that they can be manually assembled.

However, if you are using several printers with Quark, you must put up with running Apple's Chooser desk accessory in order to switch between them. In Ventura, you can switch between printers from within the program itself.

## Unique Talents

Each of the two programs has a number of unique capabilities that can be put to good use.

If you have Ventura's Professional Extension, you can make use of the powerful *Table Edit* mode. Instead of tediously defining tabs, you can design complex forms and tables with horizontal and vertical rules. When you place text in a Ventura table, it *feels* almost like entering numbers in a spreadsheet. The cursor moves from cell to cell and positions each entry exactly the way you specified. You can even apply regular paragraph tags to any of the text stored in a table.

For its part, Quark supports fancy line borders, and includes a separate Border



editing utility. Instead of placing simple lines around a document, you have access to an unlimited supply of decorative borders. This can be especially helpful for designing advertisements and brochures.

Quark also provides better word processing capabilities than Ventura. Among other things, you get a fancy search-and-replace menu that lets you modify both words and typographical attributes. For instance, you could change all occurrences of 10-point Helvetica to 12-point Garamond. In Ventura, to change the type specifications for individual words and phrases, you must either edit the document from the beginning to the end, or exit Ventura to edit the document with a word processor. (Paragraph specifications, as mentioned earlier, are easily changed by altering tags.)

Like any decent word processor, Quark also comes with a spell checker. This is an important feature, because the program keeps all text and graphics for a given document in a single file. You *cannot* extract a document from Quark for editing in a separate word processor. (You can move chunks of text using the Mac's standard cut-and-paste feature, but when you cut text from a Quark document and paste it into Word, for example, you'll lose all of the typographical attributes that were added in Quark.)

Because of this restriction, in a workgroup situation all users who need input and editing privileges must run Quark XPress if they want to edit the original text of a document.

Unlike Quark, Ventura maintains separate graphics, text, style and document files. Although this makes things a little more complicated when it comes to backing up files and transferring document "chapters" to other systems, this method does have several distinct advantages.

First, you can substitute text and graphics files, without affecting other design elements of a chapter. This makes the program more conducive to the traditional process of writing, editing, design and paste-up. Writers and editors can stick with their favorite word processors, illustrators can choose between Corel Draw, Micrografx Designer or a pixel-based editor, while the designer/paste-up artist puts it all together with Ventura. Even after an initial draft of the work has been completed and a proof printed, the writers, editors and illustrators can still

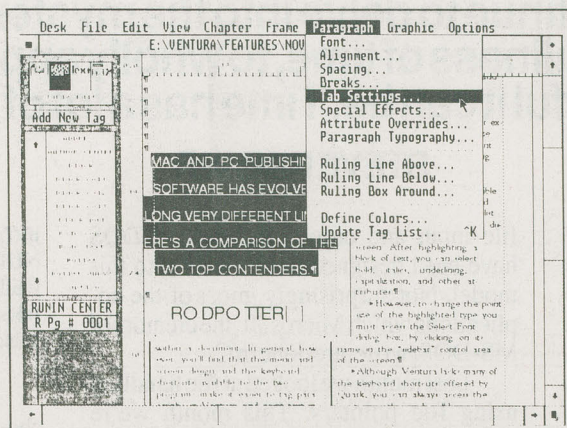
make further additions and modifications without actually using Ventura.

## Pre-tagging

Anyone who has edited a text file after Ventura has been using it, knows that the program inserts paragraph tag names and marks for typographical effects such as bolding and italicizing. From an editorial perspective, this leads to one of Ventura's most important features: the ability to *pretag* a text file so that most of the work is done even before the text is brought into Ventura.

For example, you can specify that text is to be italicized when it is brought into Ventura by surrounding the text with the following codes:

<I>Text<M>



The <I> changes the font to italics, while <M> returns to text to medium. In a similar fashion, users can specify different point sizes and typefaces.

More importantly, it is possible to place paragraph tag markers at the beginning of every paragraph in a document. For example, a headline could be pretagged in the following way:

@Headline = Industry Predicts Green Product Sales to Increase in 1990

When this text is loaded into Ventura, the @@Headline tag name is not displayed. Instead, all of the typographic attributes associated with the "HEADLINE" tag are *applied* to the paragraph copy. For instance, the headline might display as 36-point Helvetica Bold, centered within a 3-column frame.

Pretagging is still one of Ventura's most underused features, even though it is a technique that can save hours of formatting on both long and short documents. Using the macro and search and replace capabilities of almost any word processor, there is much to be gained by pretagging

text files that are destined for Ventura. (This gives Ventura much of the power of the heavyweight document processing languages, such as TeX.)

Perhaps the most impressive application for pretagging Ventura text files is in the area of database publishing. With some planning, it is relatively easy to automatically pretag a large database so that it will format properly when placed in Ventura.

## Who Should Use What

The key to Ventura lies in its ability to maintain an unlimited number of distinct styles. At any time, you can apply a different style sheet to a document. Because each paragraph in a document is tagged, you can quickly make global changes to all or some of the tags.

Quark XPress, on the other hand, makes it easy to manage complex standard layouts by saving them as templates.

Although their approaches are different, both Quark and Ventura can be used effectively to format long documents such as books and manuals. The choice between these packages is not an easy one.

It has long been said that the Macintosh is the system of choice for graphic arts environments, while the PC is preferred for corporate applications. But, like many other Macintosh-PC "truisms", this one has lost

all relevance. It is no longer a safe bet for PC and Macintosh ideologues to spurn each other's hardware and software as a matter of course. When it comes to desktop publishing, users can only make the right decision by asking nuts-and-bolts questions. Do we need the tiling control offered by Quark for oversize documents? Can we use Ventura to manage a large number of standardized typographic styles? Do we need to pretag our text files? Will we be formatting a lot of tables and charts? Do we need Quark's advanced text wrap capability?

Choosing a desktop-publishing platform is a far-reaching decision, and one that should be made rationally, after consideration of all the alternatives. Careful comparison-shoppers should be able to assemble exactly the system that will suit their needs.

**Quark Xpress:** Quark Inc., 2525 West Evans, Suite 220, Denver, CO 80219.

**Ventura Publisher:** Xerox Canada Inc., Desktop Software division, 5650 Yonge St., North York, ON M2M 4G7; phone (416) 733-6386; Fax (416) 733-6701.



# The Techie's Guide to C Programming

## Part 11

This month we'll continue to delve into the mysteries of high level file access and, in the fullness of time, to wholly appreciate how weird and powerful it can be. Time has a lot of fullness.

STEVE RIMMER

Last month we got into the basics of file handling under C. It might have seemed a bit nasty then, but high level file access is actually very easy to use once you get used to it. Most of the difficulties that programmers new to C have with it stems from their prior involvement with BASIC's `fileroutines`.

BASIC conditions one to believe that nothing associated with disk files can really be easy.

High level file access under C has a number of very powerful features, as we'll see. It can make accessing disk files no more complex than accessing your keyboard and screen.

In fact, as far as C is concerned, all these functions are basically the same.

### Illusion and Reality

In an ideal computer, everything external to the processor would either be a data source or a data sink, or both. The screen would be a data sink — data goes to it. The keyboard would be a data source, that is, data occasionally comes from it. Garbage occasionally comes from it too — it's a bit hardware dependant in this respect. Consider well that you are the hardware it's dependant on.

Disk files can be both data sources and data sinks.

Under C, we have the option of treating data in this way if we want to by using "streamed" data handling. The standard

file input and output channels of DOS have been designed to fit nicely into this model. Not surprisingly, most of the applications which Microsoft, the creators of MS-DOS, write, are done in C.

Last month we looked at file handling using file pointers. This month we're going to expand on that and see how the concepts of file handling can work with most forms of data which moves in and out of the computer.

When a C language program starts up, it automatically opens five files. These are given names, and are available to any programmer who chooses to use them. This is how they're defined under C.

```
stdin
stdout
stderr
stdaux
stdprn
```

Now, the use of these things might not be completely obvious. The problem with them is that they're so elegantly simple that they defy immediate understanding.

It's so zen-like as to make your karma green.

Consider the following program. This will read in a disk file called WOMBAT.DOC and display it on the screen as it's read.

```
FILE *fp;
```

```
if((fp=fopen("WOMBAT.DOC","ra"))!=
NULL){
while(putch(fgetc(fp))!=EOF);
fclose(fp);
}else puts("WOMBAT.DOC ain't there");
```

The principal behind this program should be fairly clear if the cat didn't eat your copy of last month's ETT before you read it.

Each of the five mystery words previously mentioned acts just like the file pointer in the above example, except that each one is tied to a particular device, rather than to a disk file. Consider the following program.

```
if((fp=fopen("WOMBAT.DOC","ra"))!=
NULL){
while(fputc(fgetc(fp),stdout)!=EOF);
fclose(fp);
}else puts("WOMBAT.DOC ain't there");
```

What this is really doing is to copy the file WOMBAT.DOC into the mystery file pointer called `stdout`. For reasons too warped for mere mortals to get their heads around, everything written to the file pointer `stdout` will appear on the screen.

Here's a variation on this program.

```
if((fp=fopen("WOMBAT.DOC","ra"))!=
NULL){
while(fputc(fgetc(fp),stdprn)!=EOF);
fclose(fp);
}else puts("WOMBAT.DOC ain't there");
```





MOORSHEAD  
PUBLICATIONS

SOFTWARE  
CATALOGUE

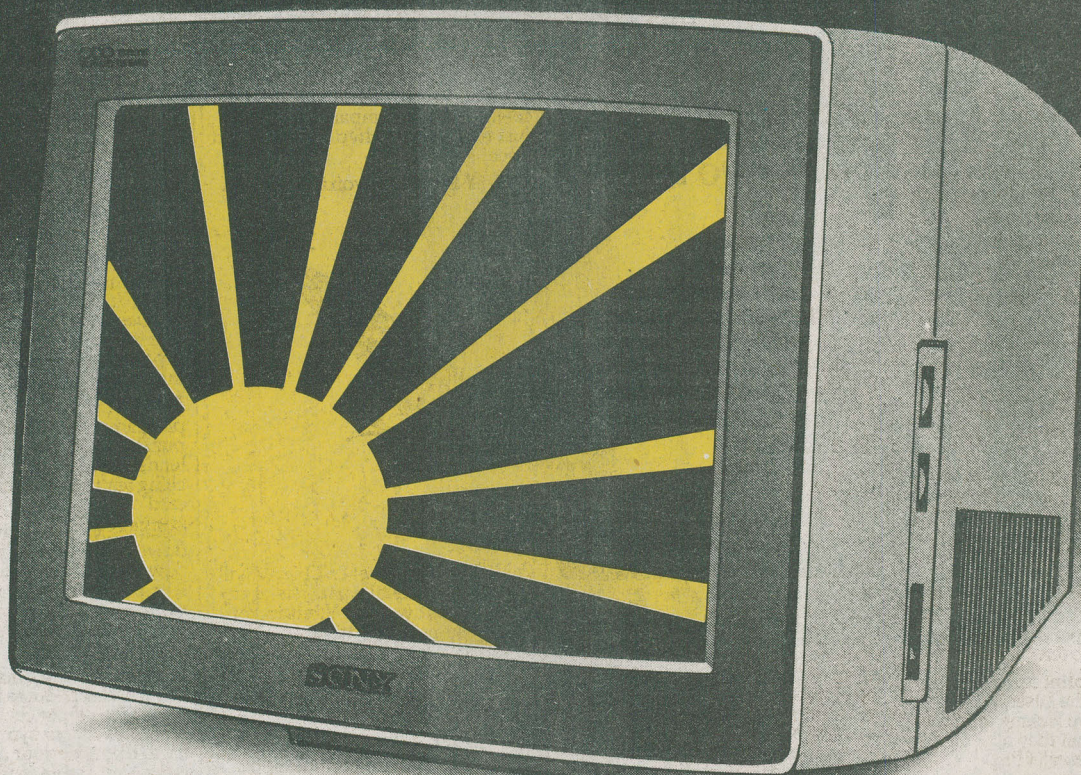
FALL  
1989

**BONUS  
SUPPLEMENT**

FOR READERS OF  
COMPUTERS IN EDUCATION,  
COMPUTING NOW!, ELECTRONICS &  
TECHNOLOGY TODAY, CANADIAN  
COMPUTER SHOW ATTENDEES  
AND PREVIOUS SOFTWARE  
PURCHASERS



There's nothing like black  
to brighten  
your day.



**The Trinitron Monitor from SONY.**  
**Its deep black background makes everything shine.**

Have you ever seen colours jump? Get to work on a Trinitron Monitor from SONY and stand back. The Trinitron's deep black background makes everything you do a stand-out.

**Call EMJ, Canada's High Performance Distributor, to find out more about this magnificent SONY monitor today.**



**Data Systems Ltd.**

**SONY**

HEAD OFFICE:  
GUELPH  
(519) 837-2444  
FAX (519) 836-1914

BRANCHES:  
VANCOUVER  
(604) 875-9344  
FAX (604) 875-6393

CALGARY  
(403) 229-1535  
FAX (403) 244-4496

WINNIPEG  
(204) 452-4411  
FAX (204) 452-8594

TORONTO  
(416) 454-2940

MONTREAL  
(514) 849-4171  
FAX (514) 288-6062

HALIFAX  
(902) 423-6152  
FAX (902) 423-3628

\*TOLL FREE (Man, Ont., Que, N.B., N.S., P.E.I.): 1-800-265-7212

(BC, Alta.): 1-800-663-9048



# ALMOST FREE™ SOFTWARE

## A F S P C 5 3

**MONOPOLY** is a first class implementation of the popular board game... one of the best we've ever seen. Requires an EGA card.

**EMS** is an expanded memory simulator. If you have an AT or 386 system with extended memory, this little jewel will make it appear as LIM expanded memory for applications which require it.

**MT** is an interesting resident program. It expands selected parts of the text on your screen into huge letters. Great for working late at night or if your eyes are shot. Mostly, it's small and interesting to play with.

**CROSSWORD** lets you compose and play with crossword puzzles in style. Featuring a well thought out user interface and a sample puzzle. Requires Microsoft Windows.

**MICKEY** is a Windows screen clock which replaces the traditional Microsoft implementation with everyone's favourite fictional rodent. Requires Microsoft Windows.

**RBREAK** is somewhere between Breakout and Arkanoid. Requires Windows.

**DKEY** is a simple but powerful keyboard macro program, in many ways the equal of SuperKey and Pro-Key. Saves you ages of typing.

**GRAFCAT** is just the thing if you've been collecting our almost free clip art or any other picture files. It prints hard copy of sixteen image files per page... along with their file names and such... so you can see what you've got at a glance. Requires a LaserJet Plus compatible laser printer. Supports most of the popular image file formats.

**FONTSUM** will print up a summary page of all the LaserJet Plus soft fonts you have kicking around so you can tell what they all look like. Requires a LaserJet Plus.

**MAP** will draw a map of all the hard drives on your system, telling you instantly how they're being utilized and how much space is free.

**GRAVITY** is a fascinating simulation of celestial mechanics. See how planets, stars and other celestial bodies interact in real time. Create your own universe... it's a blast.

**EMCACHE** is a memory cache program which runs in expanded memory. It can greatly speed up hard disk operations, especially in applications such as database managers. However, it ties up no DOS memory doing so.

**SCRABBLE** is an implementation of the popular board game. Play against the computer in full colour.

**POPHITS** is a complete database of all the top forty singles and albums from the early sixties until the present, and with a snappy little query program to search the list by artist, album, year, and so on.

**SCALEMASTER** is a guitar tutor

program which will blow your socks off. Aside from helping you tune the beast, it will show you how to play every imaginable scale in all keys.

**MILLEBORNE** is an eye-popping implementation of the classic travel game. The action's fast, the graphics are superb. Requires an EGA card.

**SPACE** is a slick little asteroids game for Microsoft Windows.

**BIORHYTHM** is a program to compute your personal biorhythms, displaying the results in full colour graphics. Requires an EGA card.

**S-TREE** is an extended directory tree mapping utility which will show you what you've got on your hard drive, where it is and how much space it occupies. Better than VTREE.

**TVSAT** is a great program if you have a satellite dish, as it tells you exactly where the satellites are.

**\$24.95 (TWO DISK SET)**

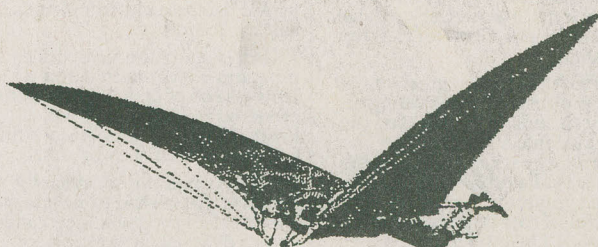
ing yourself into oblivion. Don't leave home without it. Requires Microsoft Windows.

**STAR GOOSE** is a strange little arcade game in which you fly a space ship over a strange alien world blasting things into cosmic dust. It's fast and the graphics are superb. EGA or VGA card required.

**ALMANAC** is a computerized version of the old farmers' almanac that usually accosts you while waiting in the supermarket checkout. Find out what the best days to drill wells are, bring up a host of useful charts and tables and follow the phase of the moon.

**VIEW2** is a file view program with schizophrenia. It lets you scroll through two files side by side, allowing you to compare them or just to work with two documents at once.

**DUSTY** is the last word in Ventura



## A F S P C 5 2

**PC-AREA** is the last word in telephone area code programs. Hit the alternate key of your choice and it pops up a window with all the provinces and states in North America, along with a comprehensive area code finder. Let your fingers hoof it in style.

**FREEFORM** is a data base manager for people who don't want to mess about with dBASE. It creates a free form data base which is easy to use, requires no set up and can be keyed by a trained chimp.

**MAZE** is a puzzle. It looks simple, but it's a real brain buster. The solution's included in case you get totally frustrated.

**OHM-TSR** is a handy pop up program which will work out resistor colour codes for you.

**STACK** is a DOSEDIT replacement from Australia. It keeps a stack of your previous command lines, plus it has a handy pop up window which lets you see all your previous commands at a glance.

**CREDIT** is a credit card manager, suitable for use in business or to keep track of your personal finances. It helps you refrain from spend-

Publisher style sheet utilities. It will create an exhaustive analysis of any style sheet. If you use Ventura you won't want to miss this one.

**KBSPEED** speeds up the repeat rate of your keyboard... and suddenly, all sorts of programs seem to go a lot faster.

**RETPLAN** is an RRSP and annuity planner and calculator. It lets you see just how much you'll retire with based on your annual contributions. It's one of the last ways going to get something past the government.

**\$24.95 (TWO DISK SET)**

## A F S P C 5 1

**ASCII** is a great resident program for applications which require that you enter extended character codes into them. Rather than having to remember what the code for a U with an umlaut over it is, just pop up this window and select it from a table. Great for word processing.

**DRAFTC** is like AutoCAD without the price tag... and it doesn't need a math chip. This is a complete drafting package with pull down menus, mouse support and lots of features. It's great for applications in which you don't need all the

power of a high end drawing program. Requires a mouse.

**POLY** is a really elegant little three voice music playing program which lets you compose songs with a text editor or word processor and halve them played through your PC's speaker in up to three voices. Sample songs are included.

**TRICAL** is the most sophisticated pop up calculator program yet devised. Outthinking SideKick and all the commercial calculators, this one will do things even real calculators can't get together.

**BANANOID** is staggering. It's a VGA game which makes Breakout not only interesting but addictive. Mere words fail to describe the limitless time wasting potential of this thing. Suffice it to say that if you own a VGA card and a mouse and go through this life never having played Bananoid, all future incarnations of your spirit will laugh at you behind your collective backs. Requires a VGA card and a mouse.

**CLIP** allows you to extract sections of GIF files and make them into new, smaller GIF files. It's a great tool if you use our POSTGIF program to create desktop publishing clip art from GIF files.

**EGAI NT** is the last word in Tetris programs. The ultimate falling shape puzzle, this features colour, extended shapes and a plethora of exciting features. Requires an EGA card.

**FREEMEM** is a dandy little Windows program which puts a window on your screen to tell you the current amount of free memory available to your applications. No computer should be without one. Requires Windows.

**NTERNIST** is a fascinating and oftentimes useful package to help you figure out... if not cure... what ails you. Give it your symptoms and it'll try to diagnose your condition. This is not a substitute for a real physician, but it's great if the provincial health care plan has put you seventy-nine places back in the waiting list.

**PUZZLE** is a Windows program which takes one of several graphics, scrambles it into little bits and challenges you to re-assemble it. Quite a decent little program, this. Requires Windows

**SUBMIT** is an instant batch file. It allows you to run multiple commands at one time from the DOS prompt simply by separating them with colons. An essential gadget, this.

**TIME** puts a digital clock into a Windows screen. Takes up less space than the one with hands does, and it looks slick. Requires Windows.

**TODDY** is a DOSEDIT replacement. It adds a sophisticated command line editor to DOS to allow you to recall and edit previous commands. Saves buckets of typing and uses WordStar editing commands.

**\$24.95 (TWO DISK SET)**



## A F S P C 5 0

**BAK** will wander through your entire hard drive... every subdirectory, no matter how well buried it might be... and wipe out your BAK files. Reclaim countless megabytes of wasted space, be the envy of lesser mortals, all without unpleasant exercises.

**CHAIN** will tell you how much space any file on your disk occupies. This sounds like much ado about nothing, but CHAIN actually tells you how many clusters a file occupies, and, for the technically curious, where said clusters lie.

**CUBE** is a useless program that runs under Windows and displays a constantly rotating three dimensional cube. Despite its uselessness, everyone we know who has it runs it a lot... no idea why. Requires Windows.

**DUNGEON** is an ASCII game that lets you cruise through a complex, multiple layer dungeon picking up things and killing creatures. Sounds a lot like a blind date in Calgary to me. Requires that ANSYS be installed.

**IBM\_SCRN** is a downloadable character set for the Epson FX printers... and all compatibles... which emulates the PC's screen graphics characters. Make your screen dumps look like screen dumps rather than ASCII stew.

**JOT-IT** is the most flexible, interesting little resident note pad program we've come across. Loaded with features, it will find a warm place on your hard drive... right next to the platter bearings.

**MINDREADER** is the oddest word processor ever written. Especially designed for people who don't type too quickly, it uses artificial intelligence to attempt to anticipate what you'll say and fill in things for you. It sounds a bit far fetched, but the beast works.

**POSTGIF** is the latest version of

this powerful program for turning GIF files into desktop publishing clip art. Now features variable size halftone screens for better reproduction.

**PURGE** is a handy little utility for selectively deleting files.

**QCRT** will speed up the screen speed of most machines by quite a bit. This makes DOS and many other programs which print through the BIOS really shift into overdrive.

**SLITHER** is a version of the popular snake game written especially for the EGA card. It's a bit warped, too... there's a frog involved. Requires an EGA or VGA card.

**SPEED** will speed up the screen display of an EGA or VGA card even better than QCRT, above. Includes the ASM source in case you like to hack.

**CHEMVIEW** is neat even if chemistry usually bores you into catatonia. It displays complex molecules in three dimensions and rotates them for you. Includes a selection of sample molecules. Requires EGA or VGA card.

**FONTINFO** is a DIR replacement that only wants to know about LaserJet soft fonts. It will find all of the soft fonts in a directory and tell you about them. Great for desktop publishing.

**DROPCAPS** are also great for desktop publishing. Consisting of twenty six little PCX files, they can be inhaled into Ventura, Page-Maker... any package that uses the popular PC Paintbrush image file format... to provide you with beautiful, ornate large caps from A through Z. Dress up that next report with huge letters.

**THESAURUS** is a computerized thesaurus program. Give it a word and it'll find you a selection of others that mean something like the same thing. Includes a huge dictionary.

**\$24.95 (TWO DISK SET)**

## A F S P C 4 9

**PHONES** is a Windows application which keeps track of telephone numbers... it'll even dial 'em for you if you have a mode. Requires Microsoft Windows.

**BRAIN** asks you lots of questions and evaluates how much of your thought processes are left brain, how much are right brain and how much are mixed brain. Requires a brain.

**LM** is the best mailing list program and label maker ever written. If you run a small business or send out news letters, this program will change your perception of the universe. dBase compatible.

**ONEKEY** is a keyboard macro program. It stores up to fifty strings, each one callable with the key combination of your choice. Ends buckets of repetitious typing.

**ALDO** is a game in the tradition of Mario Brothers. A little fellow with a beard leaps over barrels, climbs ladders and goes for the gold. Requires an EGA or VGA card.

**POPDBF** is a pop up utility which allows you to browse through dBase, Clipper, Foxbase and compatible database files from within any application.

**TIKLER** is one of the nicest tickler programs we've encountered. It reminds you of up to three hundred events on the future, without knotted handkerchiefs, bits of string or things written on your arm.

**CAITY** is small and so brilliantly pointless that we had to include it. It's a resident program. Run it and it plays a different musical note for every key on your keyboard. It's a delight to listen to as you type DOS commands... a veritable symphony in WordStar.

**CONNECT4** is the best and most ruthless computer implementation of this popular game.

**PALETTE** allows you to set the colour palette in Windows sensibly. If you don't know you need this program you don't know how badly you do. C language source code included. Requires Microsoft Windows.

**LIFE** is a three dimensional version of the classic program in which a colony of creatures lunch out on each other. A programmer's toy, the C language source code is included.

**TRI-MAZE** is a blast. It draws complex mazes and then challenges you to solve them.

**PERIODIC** displays the periodic table and lets you scan a cursor over it to get detailed information about each element. Requires an EGA or VGA card.

**FANS** Pilot a space ship through a field of waving fans catching bouncing loonie dollars as you go. An EGA or VGA card is required.

**CHESS** is a three dimensional chess game which actually allows you to move the pieces around, rather than just typing in co-ordinates. This has to be the last word in computer chess. Requires an EGA or VGA card.

**\$24.95 (TWO DISK SET)**

## A F S P C 4 8

**DRIVEL** is a brilliant addition to any office. It produces very meaningful sounding text which is actually pure drivel. It will happily generate as much text as you want, suitable for use in memoranda, reports, letters and year end stockholders portfolios.

**CPRINT** is the ultimate C source file printer. Aside from generating first class hard copy listings complete with headers, footers, page numbers and so on, it will also generate an index and a table of contents for any source file.

**EGARULE** pops a ruler up over any EGA text screen. You can position the ruler where you need it, and use it for the accurate positioning of text in different applications. It's amazingly handy. Requires an EGA or VGA screen.

**INVENTORY** is a home or office inventory program which maintains a running database of your possessions. It keeps track of what everything's worth, and provides you with an estimate of the replacement costs. Reduces potential "negotiations" if you have to make an insurance claim.

**JDOS** will pop a command line up from within most applications.

However, it does a number of clever things to allow you to have all the DOS memory in your system available for applications run from within other applications... quite the clever trick when you think about it.

**MORTGAGE** is a powerful mortgage program. It does a number of types of calculations, and will print hard copy reports. It's great for doing "what if" plans to find ways to slaughter your mortgage quicker.

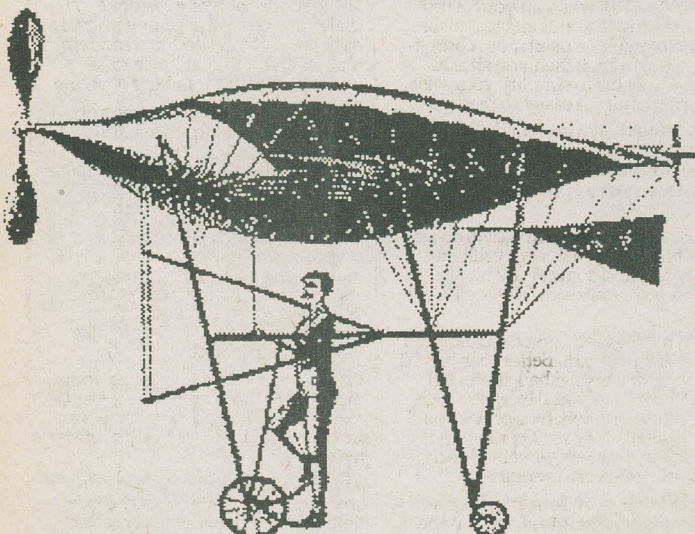
**PIZZA** will teach you to make pizza at home. It contains a variety of recipes and tips. Avoid getting anchovies in your disk drives.

**POSTGIF** is the best way of generating black and white printouts from full colour GIF files. This program creates true halftones... not dithers... from GIF files and stores them as EPS (encapsulated PostScript) files. These can include previews for use with Ventura publisher, too... you can use GIF files as black and white art for desktop publishing. If you've tried our Colour Clip Art disks, you'll want this program. Requires a PostScript printer.

**SLEUTH** is a fascinating graphic ASCII game. A murder has been committed in an old house. There are various odd characters around, and various clues. Your task is to wander around the various rooms, check out the clues and unmask the villain before you get crunched. The game changes with every playing, and you can use your own cast of characters if you like.

**SORTDEM** is a particularly interesting program. It illustrates the process for sorting a list of words using five of the most popular sorting algorithms. You can see how each one works, and you'll understand why each one is preferable for some applications. C language source code is included.

**\$19.95**





## A F S P C 4 7

**LETTERS 'N LABELS** is a fabulous mailing list manager if you have moderate sized lists to keep. It will store them in a custom data base, let you update the list and print out labels whenever you need them.

**ARGH** is the sound that most people make after playing this puzzle game for a while. It's just a series of sliding blocks, but it'll drive you mad trying to solve it.

**DERASE** is the most comprehensive file un-eraser we've seen so far. It handles everything from floppies to hard drives of up to thirty two megabytes, and it tells you if your files have been trashed and are therefore unrecoverable.

**HPPS** is a PrtSc replacement especially designed for owners of HP LaserJet Plus compatible laser printers. Includes ASM source.

**FINDER** is a Microsoft Windows utility which locates files anywhere on your hard drive.

**DO-ONCE** is a program which can be set up to run specific applications, utilities or batch files at specific times. It will, for example, automatically back your hard drive up to a streamer every Friday afternoon once everyone has gone home. This is the most flexible and reliable one of these things we've found to date.

**LAST RESORT** keeps you going when your computer hangs. It will get you back to DOS, copy the contents of a RAM disk onto something more permanent and restart your heart when your system appears to have locked up solid.

**AXEL-F** plays the theme from Beverly Hills Cop. It's not all that useful, to be sure, but it's small and fun. Requires BASIC.

**LIFETIME** is a serious program which uses solid statistical research to estimate your life span based on your health and lifestyle... it can be a bit sobering. Requires BASIC.

**POPDATE** is a really well executed pop up calendar which shows you the current, previous and next month for any month you like.

**800K** uses the high density drive of an AT or 386 based machine to format normal low cost dual density floppies to hold eight hundred kilobytes worth of data, or more than double their usual capacity. It's a great money saver, considering the price difference between these and quads. Includes ASM source.

**GLEANERS** is a complete index to National Geographic magazine from 1957 through to 1987, along with a really superb database program to search for things by subject, place and so on. It's great for research, and essential if you've been saving back copies for a while.

\$19.95

## A F S P C 4 6

**PAINTER'S APPRENTICE** This is a complete implementation of a MacPaint style paint box program for the PC, equal or superior in many ways

to the original... and a lot easier to use than is PC Paintbrush or Microsoft Windows Paint. This is a phenomenally enjoyable program equally suitable for a bit of image hacking or for serious art. It's a must for desktop publishing. Requires EGA or VGA card and a mouse.

**DGTERM** is an immensely clever program which pops up a telecommunications terminal from within any application and allows for background XMOD-EM and YMODEM file transfers.

**FINANCIAL PARTNER** is a storehouse of financial planning utilities. It will work out amortization tables for loans, help you plan annuities and so on. No one with more than twelve dollars should be without this package.

**FR386** is the fastest, slickest and most stunning fractal graphics package we've ever seen. It includes a zoom box which lets you move successively closer to the images you create. Requires an 80386 based computer and EGA or VGA card.

**HPCALC** runs under Microsoft Windows and gives you the complete functions of Hewlett Packard style programmable scientific calculator. No number will get away from you once you have this thing running.

**LOOKFOR** is a powerful text search utility which will find selected strings of text in any number of files. It's a useful research tool... and a great asset for people who can't remember where they last saw something.

**QUICKCOPY** is a replacement for the DOS DISKCOPY program. It copies disks in about half the time, and allows for multiple copies of the same disk without reading the original for each one.

**RACECAR** stands proudly in the tradition of brilliant public domain ASCII games. Using nothing more than text and colours, it allows you to drive a speeding car through a twisting, debris strewn race course until you finally pile up on the walls or oil slicks.

**TIFFANY** is the first really workable screen capture utility for Windows we've encountered. It allows you to create graphics files from any window on the screen.

**TRAN** is a rather astounding piece of work. It reads text files... through the speaker of your PC, in English.

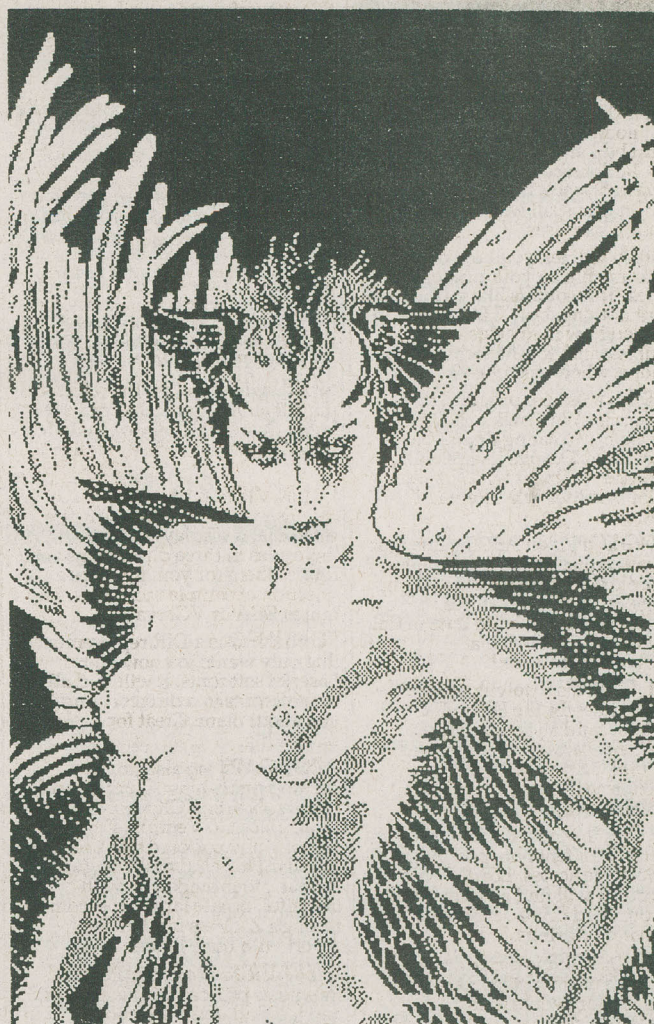
**ZAPDIR** kills whole subdirectories in a single shot. It ends the annoying requirement of DOS that you manually wipe out all the files and sub-subdirectories in a subdirectory before you remove it.

\$19.95

## A F S P C 4 5

**POPDOS2** is a pop up DOS shell. You can rename, delete, type and generally meddle with files from within any application. It can save your life when your disk is full and your file hasn't been saved.

**CALLFOR** is a resident equivalent of those pink message slips that proliferate around offices... just the



thing for an over worked receptionist, especially one with bad hand writing. It can be popped up from within a word processor or other application when the phone rings.

**CLEARCUT** will scan your word processing files and suggest places wherein you've used more complicated wordings than you should have. It helps to simplify your writing and make it easier to read.

**CONFMT** is a resident disk formatter. It allows you to format floppy disks as a background task while you run normal programs. It's quite a time saver.

**FLEES** is like Space Invaders on acid. It's blindingly fast, with brilliant graphics and some really bizarre aspects. Requires an EGA or VGA card.

**PALMEGA** is a computerized palm analysis program. Better than an old lady with a crystal ball, it will tell you how long you'll live, how rich you'll get and whether or not you'll meet a tall, dark stranger who'll try to sell you swamp land in Florida. EGA or VGA card required.

**PAUP** will print four pages of normal text on a single sheet of paper on most laser and inkjet printers. It has a number of sophisticated formatting features, too.

**SHFTPICK** is ideal for people with a

lot of resident programs on their hard drives. It allows you to hold down the Alt key and bypass loading them when your system boots up.

**MDIAL** is a memory resident dialer program and phone number data base. Connected to a modem, it allows you to dial voice calls without actually touching a phone.

**SMOOTH** is the leading edge of text browsing programs. It will smooth scroll back and forth through any text file. This may seem like overkill... well, it is, actually... but it's awfully neat to watch.

**VALET** is the best DOS shell program we've encountered. It will move, mass copy, delete, rename and generally handle the files on your hard drive in menu driven comfort. It's ideal if you don't like typing in commands.

**WIPE** totally destroys files on your disk so that they can never, never be restored and looked at again. It's an essential tool if you deal with sensitive data.

**YEARCAL** creates calendars for any month of any year of the twentieth century. However, it creates more sorts of calendars than you can possibly imagine... in sixteen languages, including Texan.

\$19.95



## A F S P C 4 4

**BCOPY** is one of the cleverest copying programs around. It hides in the background while it's working, so that immediately after issuing a copy command your DOS prompt returns and you're ready for whatever's next. A great little time saver.

**BDS** is a slick pop up electronic engineer's calculator. It handles things like wavelength, capacitance, radio equations and so on.

**CALCQF** analyzes your system and figures out how much you can speed things up by changing the refresh rate of your memory without crashing your machine. Then it generates a small COM file to include in your AUTOEXEC file.

**JIVE** translates any English text into jive.

**LUM** is a sophisticated sideways printing program which is great for spreadsheets or any application wherein regular paper just isn't wide enough. It supports multiple fonts, effects and so on. Requires an Epson FX-80 compatible printer.

**NJFRERAM** will show you how much free memory you have from moment to moment up in the upper right corner of your screen. Great for spreadsheet users, amongst others.

**ORDER** changes the order in which files come off your disk when you type DIR. This allows you to pre-sort your directories, or adjust them in any order you like to make frequently used programs boot more rapidly.

**PYRO** we've had fireworks programs before... but this is the best. It does EGA fireworks, complete with sound effects, and is truly glorious. Includes C language source

code. EGA/VGA card required.

**SOT** is the son of Tetris, the addictive game from the Soviet Union. This one is even more devious.

**STYLIST** is an essential tool for any Ventura Publisher user. It allows you to edit, manipulate and print out any style sheet.

**TONTO** is a SideKick-like program with a host of features, including a clock/calendar for any year since the middle of the sixteenth century, an ASCII chart and a printer setup program.

**MR BOSTON** is the ultimate bartender. It holds recipes and complete directions for zillions of mixed drinks... from the common to the delightfully bizarre... and provides you with an outstanding user friendly program to access and even add to the list.

\$19.95

## A F S P C 4 3

**MAGMA** is a truly weird graphic arcade cum adventure game. Tunnel through the depths of the earth, contact spies and try to assemble all the fragments of your secret document.

**BANKER** will keep your checkbook in balance... as well as anything short of divine intervention can.

**FONTFILTER** adds special effects to LaserJet softfonts. Included are such effects as drop shadows, enclosing boxes and even blood dripping from each character... no foolin'... Also includes the complete C source code.

**READRITE** is a real time readability analyzer. A resident program, you can pop it up from within your favourite word processor and get a readability index for the contents of your screen. Very slick.

**CALC** is the nicest pop up programmer's calculator we've encountered... and it's pretty hot for anyone else who has to deal with numbers too. It includes base conversion and a host of other useful functions.

**CARDFILE** is a little pop up data base program which will keep track of people, places, phone numbers... it even dials your phone through a Hayes compatible modem.

**RECORDER** will keep track of the frequency of access of the files you use to help you decide how best to use a RAM disk.

**BARMENUS** is a system to compile and implement Lotus style menus in applications other than Lotus. It's a great toy for die hard 1-2-3 users, and not a bad user interface for the rest of the planet.

**SNIPPER** is the slickest text cut and paste program we've encountered to date. Copy text from the screen of just about any application into just about any other one. Great for getting spreadsheets into your word processing documents.

**SWEEP** will execute any command you like in every sub directory of your hard drive.

**CONFIG** is splendid. It lets you alter the way your CONFIG.SYS file is interpreted by DOS when your system boots up. You can exclude specific drivers at boot up time to free up memory space... no PC should be without it.

**Z80XASM** has been requested by a number of our users. It's an assembler which runs on a PC compatible system but assembles ASM source code for the Z80 microprocessor. Includes a Z80 machine language monitor as a test file.

**HERCSAVE** is the most reliable Hercules screen blanker we've come across. Save those green screens.

**FSEE** is a quick and nasty way to see what LaserJet fonts look like without having to download them to a laser printer... it shows them on the screen of your PC in graphics mode. Handy for use with FONTFILTER, above.

**OKSCR** is a really elegant way to get reliable screen captures from graphics applications. More to the point, it actually works. Writes to PC Paintbrush compatible files.

**VALSPEAK** translates English into valley girl talk. Gag me with a spoon.

**TED** is a very small text editor... two kilobytes is very small. It's about the easiest little editor in creation for just whipping up a few lines of a batch file or changing a driver in your CONFIG.SYS file. It's also good for program editing.

**EGALINES** is a collection of tiny utilities which will set your EGA card to different line sizes so you can see what text looks like in the higher resolution modes. Includes 12, 25, 35, 43 and 50 line modes.

**EGAITAL** puts your EGA screen in italics mode. Not blindingly useful, but only a hundred bytes long.

**PCXSCOOP** is a file reader and printer for PC Paintbrush PCX and PCC files. Let's you check 'em out without loading the whole ZSoft circus. Handy for use with OKSCR, above.

\$19.95

## A F S P C 4 2

**FORMATQM** is a very, very fast disk formatting program.

**FIREWORK** blanks the screen after a period of inactivity and shows you fireworks until you do something. Windows is required.

**SNAKE** is simply the best snake game every written.

**BELL** makes the beep in your computer sound slick and sophisticated

**CALLTIME** will dial up the atomic clock in Ottawa and set your system clock accordingly. A Hayes compatible modem is required.

**CASE** will change a text file to all upper or all lower case, strip of the WordStar bits and other things.

**CDTO** provides a simple way to locate files in other subdirectories and the go to their locations.

**CLOCK** is the biggest resident screen clock in creation.

**DDATE** is a cursor driven date setup program.

**DEV** shows you where all the device drivers in your system are.

**KTIMER** times the execution of any program to the nearest 100th second.

**LISTFRAG** shows you how fragmented your hard drive is, allowing you to decide whether it's worth running a defragmenter program.

**NREFRESH** slows down the refresh rate of your system memory to increase the speed of your machine.

**RAMVIEW** is a resident program that lets you pop into a hex and ASCII dump of your system and page through your RAM.

**REPEATS** locates identical files in a complex hard drive system, allowing you to free up disk space.

**SETALARM** wakes you up at a predetermined time.

**SILENCE** more or less totally kills the speaker of your PC.

**STEPDOS** allows you to step through the execution of a program one DOS call at a time, with an informative display at each pause.

**VTREE2** shows you a map of your system and the sizes of your sub-directories. Great for pruning.

**WATZITDO** returns information about the multifarious alternate key combinations on the PC.

**WF** is a wild card find program that searches for files on your hard drive without asterisks or question marks.

**WORLDTIM** lets you see the time anywhere in the world.

**WPHD** disables writing to your hard drive temporarily, protecting it from viruses to some extent.

**XPANDISK** creates a very sophisticated, variable sized RAM disk in expanded memory.

**TUNEUP** uses your PC's speaker to generate extremely precise pitches for tuning stringed instruments.

**FORM** generates business forms.

**TCAP** captures text screens, but makes them into GEM/IMG files suitable for use with Ventura.

\$19.95





## A F S P C 4 1

**GALAXY24** is the latest version of the Galaxy word processor. Now equipped with a spelling checker, Galaxy allows the user to work on up to two textfiles at the same time and import text from one to the other. The colours Galaxy uses are user-selectable, and EGA owners may elect to display 43 lines of text instead of the standard 25. Galaxy can use the entire IBM character set, provides ten programmable macros to save you some typing, and will take advantage of a mouse, if you have one. Most popular printers are supported.

**PC-TOUCH** endeavours to improve your typing skills by recording your accuracy and words per minute as you type in the deep thoughts it throws at you from thinkers great and obscure. In executable form, PC-TOUCH comes with its BASIC source code, and allows you to change the quotes to virtually anything you'd like. **PHNWRD10** knows that you've always wanted to know what your phone number spells out, and is willing to display ... or print ... all 2,187 permutations to help you out. Few of these will actually make sense, but there may be an interesting phrase or three nestled in amongst the resultant cryptograms.

\$19.95

## A F S P C 4 0

**SQUYNCH** is an adventure game created with the Adventure Game Toolkit. Charged by Squeeb II to retrieve his ruby, you'll face various unpleasant obstacles in fulfilling his request. **SQUYNCH** has a sophisticated command parser which accepts complete sentences as valid input.

**CRAPS** is a realistic representation of the Las Vegas dice game. **CRAPS** instructions include a thorough description of how the game is played and the odds of various bets paying off. You'll need a colour graphics card and ANSI.SYS in your CONFIG.SYS file to play.

**PICEM16D** allows users of CGA, Hercules and EGA as well as VGA graphics cards to view multi-coloured .GIF, .PIC and .PCX graphic files. Plantronics and AT&T graphics cards are also supported.

**ROGER.GIF** is a multi-coloured graphic of Roger Rabbit, a cartoon hare of recent cinematic fame. Best viewed on a colour monitor.

**EDMAC** allows users to edit and (optionally save) readmac graphic files. Good for cleaning up the extra bits inherent in files ported from the Macintosh. **EDMAC** is accompanied by its Pascal source code, and requires a colour graphics card.

**OPUS** is a readmac of Berke Breathed's Bloom County character in a questionable state of Penguin Lust ...

**FOWLPLAY** attempts to settle the question of why did the chicken (or

turkey) cross the road. Similar to Frogger, this game requires a colour graphics card.

**ATALK** is a number of humorous digitised sentences which actually sound reasonably clear through your speaker.

\$19.95

## A F S P C 3 9

**BOOM** is a program to display fireworks on your screen. You probably don't think you need one of these... most likely true, but it's fun to watch. Requires a CGA or EGA card.

**COLORDIR** is a very slick... and exceedingly fast... sorted directory program which uses screen colours to make large directory listings easier to out at a glance. A colour monitor, while by no means essential, is highly recommended.

**DIGCLOCK** is a huge screen clock which reads out in seven segment numerals. Easily read from across the room, or across the street with a good telescope.

**DISPINFO** is a C source file for programmers. It's a foolproof routine to allow your code to figure out what sort of video card is in the computer it's running on.

**ED** is another C source file, this one for the standard unix ed text editor. It has been reworked to compile under Turbo C, and will serve nicely as the basis for a word processor if you want to write your own.

**EGA2RAM** runs the BIOS of your EGA card from fast RAM rather than slow ROM. It speeds up your screen quite noticeably with no snow or other drawbacks. Requires an EGA card, ASM source code included.

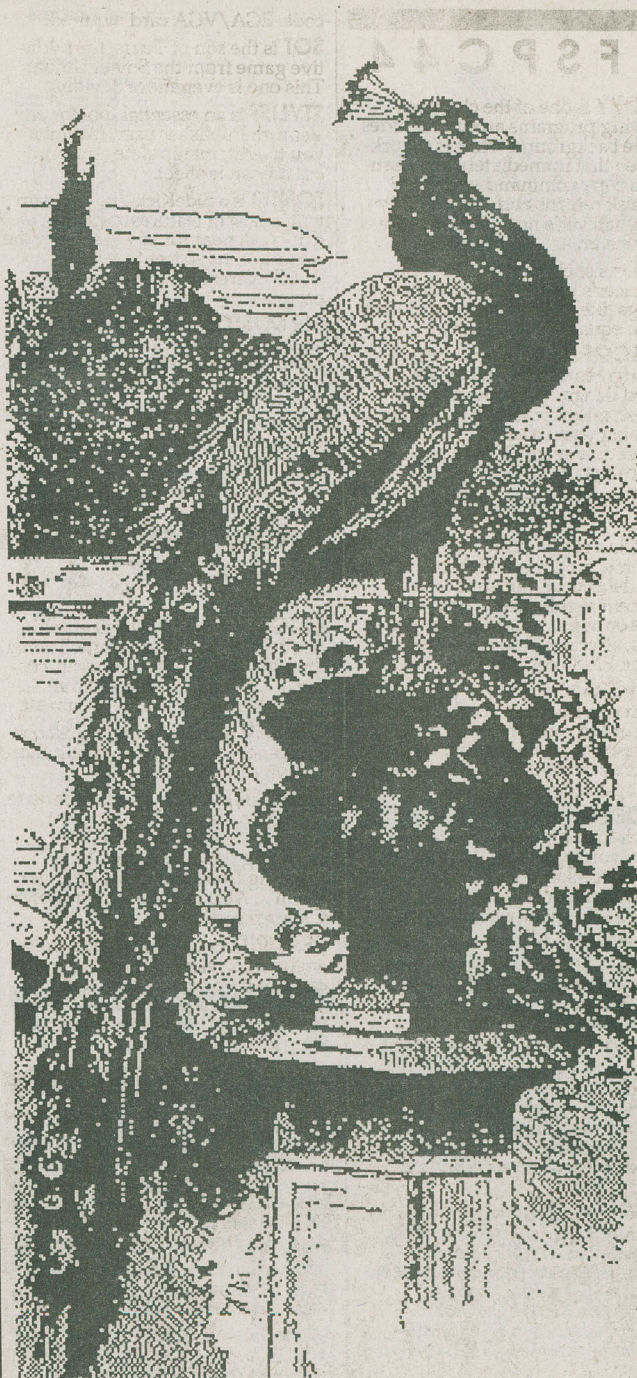
**FASTGIF** is a GIF image file reader. GIF files are glorious colour picture files which must be seen to be really appreciated. We've included a GIF file of a mandrill so you can see what they're up to. Requires an EGA or VGA card.

**HP-SLASH** reduces the size of LaserJet soft fonts... and their resultant download time... by allowing you to selectively remove unused characters from them. This is an essential tool for anyone using a LaserJet compatible printer, especially with desktop publishing.

**MAXI.EXE** is the answer to every "insufficient disk space" message in creation. It formats up a normal double density floppy to hold four hundred and twenty kilobytes, and a quad density disk to hold almost a megabyte and a half. Our tests indicated that these disks are no less reliable than normal floppies, and can be read in normal PC drives.

**PC-POOL** is a really well executed pool simulation. The ballistics of the balls is very nearly perfect, and the user interface is well thought out. It's not as gory as killing aliens, but it's better for your karma. Requires a CGA or EGA card.

**REMINDER** is a memory resident appointment calendar which pops up at the touch of an alternate key. It also features a screen clock which



can be enabled or disabled at will.

**RN** is the best way to move around the subdirectories of a hard drive ever invented. Rather than having to type in complex paths, **RN** allows you to move around in menu driven comfort.

**SAY** is the best speech program we've encountered for the PC thus far. It's pretty intelligible, especially considering that it speaks through a speaker the size of a quarter connected to a timer chip. It comes with a host of phrases, including the all but essential "beam me up, Scotty". Good for disturbing your stupor in the morning.

**VFM** will warm the hearts of Ventura Publisher users. It allows you to

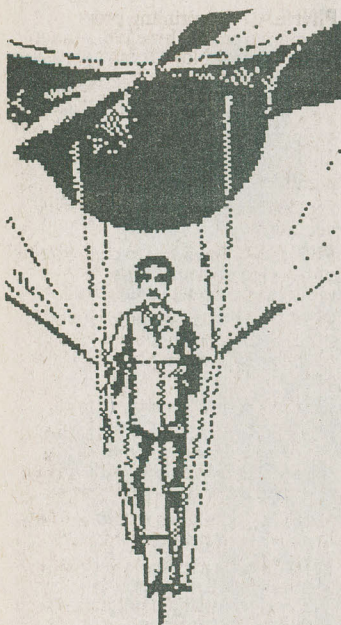
add and reorganize fonts for this popular desktop publishing system without any sweat, bother or keying of batch files. No laser should be without one.

**MCOPY** is command line replacement for the DOS COPY command which allows you to copy files to floppies with maximum space efficiency, a prompt to swap floppies when the disk is full and full CRC checking to make sure that what you see is really what you get. DOS, as it turns out, doesn't verify its copies very well even with the verify flag on. This is an essential utility.

\$19.95



Ebs to not ellos a e



## A F S P C 3 8

**CALENDAR** is a perpetual calendar running from the middle of the sixteenth century up until way past the age of Star Trek. This program will show you when important dates fall in the years of your choice as well.

**CPM2DOS** will actually read files from the disks of most CP/M systems onto your PC. Unlike commercial packages which purport to do the same thing, it includes a facility for creating custom formats. It's a perfect companion to Z80MU on Volume 11.

**GCAP** is the ultimate graphics screen capture. This resident utility will create GEM/IMG paint files from anything on your tube, suitable for use with Ventura, amongst others... an essential gadget for desktop publishing. Works with EGA monochrome, CGA and Herc cards.

**MACSCOOP** is an updated version of the popular MacPaint file reader and features support for Epson FX, Hewlett-Packard LaserJet+ and PostScript printers and for EGA, CGA and Hercules display cards. It will let you look at and print any MacPaint image file. We've included a few to get you started.

**GEMSCOOP** is very much like MacScoop, above, and has the same features for reading and printing GEM/IMG paint files. A really handy tool, for desktop publishing.

**MAC2IMG** converts MacPaint to GEM/IMG paint files for use with Ventura, among others, allowing you to access megabytes of public domain clip art. Handy for use with

IMGCUT, GemScoop and Address also in this collection.

**MEMO** drives a PostScript device to generate truly eye catching memos. It accepts raw text or WordStar files and prints them sophisticatedly.

**FONTs** is a collection of our favourite EGA font programs, which will reduce the screen characters of any EGA compatible display adapter. Included are Script, Computer, Future and others. Also included is EGAFont allowing you to create your own font programs.

**ADDRESS** is a vastly enhanced resident envelope addressing program which allows for custom printer configurations and either standing text or graphics of your choosing for the return address.

**VCHECK** will do a CRC check of the sensitive system files on your hard drive each time you boot your machine, ensuring that none of them have been infected with viruses.

**IMGCUT** extracts fragments of GEM/IMG paint files for use with desktop publishing and other applications which use this image file format. You can pre-crop pictures to save disk space and time and can also make graphics files for ADDRESS, also in this collection.

**PINPRESS** prints text very small on an Epson FX-80 compatible printer and allows you to cram up to sixteen kilobytes of text in two columns on a single page and keep it readable.

**SMALL** is the PinPress for laser printers. This thing will print about four standard pages of text on a single sheet of paper... rather small, of course. Works with any PostScript device.

\$19.95

## A F S P C 3 7

**386BUG** Some 80386 chips don't work quite right. They have problems with integer multiplication, which can cause some software to behave unpredictably. This Little program spots the duds... it's essential if you're thinking about buying a 386 machine. Includes source code.

**MASM-MAC** This is a collection of MASM assembler macros to make BIOS, DOS and 8087 interfacing a lot easier. Requires MASM to use.

**8X6** installs a really tiny screen font on an EGA card. You can get about four times the usual amount of text on your screen with this if you run applications which support it.

**AT** is a little time bomb program. It will hide in memory and run applications at specific times and dates without any attention. Allows for queuing up several tasks.

**BACHMIN** is a three part Bach minuet in BASIC... quite the trick.

**CAT** is a small sorted directory program. While hardly high tech, it is a useful replacement for DIR.

**CAVERNS** is a fast graphic arcade game. It looks a bit simplistic but it will surprise you when you get into it. Wants a CGA card.

**CMOS** is a pair of simple programs which read the contents of an AT's

CMOS memory into a disk file and then restore it. This is great for changing batteries, of course, and also for those systems with funky memory which require frequent setting up.

**DIRNOTES** allows you to attach short, one line comments to the directory entries on your disks.

**PRTSCEGA** is a program to make the PrtSc function work properly for EGA cards, allowing you to once again dump screens to your printer. Versions are included for a stock Epson FX-80 and for the Tandy DMP200. In addition, the source code comes with it, so you can hack a driver up for your specific printer.

**EDISK** allows you to put a RAM disk in the space between your normal system memory and your screen buffer, using this otherwise wasted space for something practical. It requires that you have memory in there, of course... many RAM cards will do.

**EMC** is an extended memory cache. It allows you to use LIM memory for a disk cache, speeding up your disk accesses without robbing your system of any main memory.

**GDIR** is a sorted directory program with uses the Hercules card's graphics mode to put forty-three lines of listings on the tube at once. It's very slick.

**HELP** is a slick little DOS help program which can be called up any time you need something about the PC explained to you.

**THRASHER** is a splendid system to find out the optimum setting for the BUFFERS line in your CONFIG.SYS file. It can speed up your disk accesses while actually freeing up a bit of memory.

**MCSCOOP** is the executable version of the MacPaint file reader in the Jan. 1988 edition of Computing Now! It also prints picture files... to PostScript, LaserJet+ and Epson printers.

**LDRES** is a system to make somewhat standard COM files into memory resident utilities, or TSRs. Please note that while full documentation is included with this thing, it's still a bit technical and you'll have to be a moderately decent hacker to make something come of it.

**NOREBOOT** will disable the Ctrl-Alt-Del reboot of your system. Source code is included.

**RES86** is a transliteration of the redoubtable CP/M RESOURCE machine language disassembler. Source code is included. This program requires an extensive understanding of machine level programming to be useful.

**RS232** will show you the status of your serial port on your screen. It's handy for debugging, and to see what you're modern is up to if you have one that lives inside your PC.

**WFU** is one of the nicest DOS shell managers we've yet encountered. It handles tagging, copying, deleting, renaming and generally manipulating files just as you would with the command line...but in a convenient, menu driven environment.

\$19.95  
(FORMERLY VOLUME 30)

## A F S P C 3 6

**INSTACALC** is a memory resident spreadsheet. It may not be Lotus or Excel, but it's amazingly powerful considering that it lives in an alternate key combination. Includes a sophisticated macro facility.

**ALTER** allows you to change the attributes of a file... including the time and the date.

**CALENDAR** is a sophisticated desk calendar which can be made memory resident if you want it to be. It uses data files which allow you to have it remind you of things.

**COVER** prints disk directories suitable for sticking into the sleeves of your disks... the nicest such program we've encountered. Requires an Epson compatible printer, patchable with DEBUG for other printers.

**DISKITE** is a tiny bit of code which shows you when one of your drives is running. Not much use for floppies, this, but great for RAM disks and AT style internal hard drives.

**DISKUTIL** is a poor man's Norton utility. It will walk you through simple disk level functions, including FAT table fix ups and file unerasure.

**MELT** clears the screen, dramatically.

**MONSTER** a memory resident DOS monitor. Check out what your programs do one INT 21 call at a time.

**THEGRIN** is the most sophisticated MacPaint picture viewer yet. It allows you to stretch and compress images, zoom in and out and generally hack their bits to bits. It also prints them.

**TMAP** is a clever TSR program mapper which is itself memory resident. It's superb for finding gorches caused by interacting resident programs.

**VARISLOW** is a variable speed control for AT type computers. It lets you crank the clock down to play games at their normal speeds. However, you can do it interactively, rather than from a command line.

**WATERFALL** is a fabulous MacPaint picture of an Escher drawing, suitable for use with THEGRIN or any other MacPaint reader.

**CHINASEA** is a James Clavell novel in a disk file. In this game you get to be a trader in the far east. Try to prosper without getting knifed.

**TURBO C PATCHES** is a collection of patches to fix some of the bugs in the early releases of Borland's Turbo C. If you're going to compile at warp speed you'd better have one of these.

\$19.95  
(FORMERLY VOLUME 29)



**A F S P C 3 5**

**ASTROLAB** This is a very sophisticated program for working out the conjunction of the planets for any day in history. It's not much use if you believe in a flat earth, but handy for horoscopes.

**BASERES** A resident utility, this thing will accept numbers in any base and show them to you in all the other commonly used notations. In other words, it will convert decimal to hex and back again—great for people with only ten fingers.

**BREAKON** This is a utility to make just about any program exitable with control-break. It has multiple levels of urgency—three hits gets you out of anything short of the end of civilization as we know it. Assembler source included.

**CROSSWRD** If you've ever wanted to generate your own crossword puzzles, this is the code for you. Fill it full of words and it finds places for them.

**DIMMER** The smallest screen blanker yet—two hundred and seventy one bytes.

**EPSONISM** Even people with laser printers occasionally have to deal with plebes. This program is a DOS filter to make a PostScript printer behave like an Epson.

**FASTBIOS** This is a pair of programs which will extend your keyboard buffer—without hanging your system—and increase the speed of your screen dramatically.

**FREERAM** tells you the truth about how much useable memory is available to your programs.

**LASERGRID** This is a rather good ASCII game. Place your bets and hope the aliens leave you alone.

**VMUSIC** This is a small three voice music player which handles its scores in BASIC music notation. Comes with several songs, and you can easily create your own tunes with a text editor.

**IDCKEYS** This is an assembly language program to set up the function key redefinitions under ANSISYS. It's great if you like to have keyboard macros under DOS without a keyboard redefinition program installed. Requires an assembler to use.

**IDCKILL** This will go through an entire hard drive—including all your subdirectories—and kill files that match a given specification. A bit nasty if you use it improperly, but great, say, for snuffing BAK files.

**LW86** This is an extensive pop up reference card for assembly language programmers. It includes explanations of the op codes, what the assembler directives do and so on, all at the touch of control shift.

**SPACE** Find out how much useable space is on your hard drive instantly. Includes assembly language source.

**YESNO** creates complex interactive batch files, this little program returns an error level code basic on the ASCII value of a key press. Assembler source included.

**\$19.95**  
**(FORMERLY VOLUME 28)**

**A F S P C 3 4**

**AWS** Programs that turn WordStar into ASCII abound, but this one turns ASCII back into WordStar. Let those high bits roll.

**BADCLUST** This program finds the bad clusters on cheap disks, preventing them from killing your data. If you must use low rent oxide, use it carefully.

**CHEAPFMT** Like BADCLUST, above, this program makes your life less freaky if you use cheap disks. It formats them very carefully, looking for unusable sectors.

**CCC** A C language programmer's dream, this is a "pretty print" program, that actually draws nesting loop and structure diagrams beside the source code it lists. It makes spotting even subtle bugs effortless.

**CTP** Something of a mutated fusion between snake and space invaders, this is a ruthlessly fast arcade game in first rate high resolution graphics. Requires a colour card or HGC, below, and a Herc board.

**HGC** This is the first colour card simulator for a Hercules board that really seems to have its act together for the majority of colour card graphics software. Run it and your Herc card will display colour card high resolution graphics as if it was designed for the task.

**BIGPRINT** This program prints text files in very large characters. It requires an Epson compatible printer.

**MBS** This is one of the nicer fractal programs we've encountered, as well as being one of the faster ones. It runs on a colour card, or on a Herc board with HGC, above.

**MOUSE** This is the source code for the linkable MOUSE driver, as seen in the July 1987 edition of Computing Now! It requires MASM to assemble and a C compiler to use.

**PCRR** This is one of the most interesting programs we've yet encountered. It simulates a railroad in high resolution graphics. You can lay out your railroad, equip it with multiple trains and make the whole party go. Requires a colour card or HGC, above and a Hercules board.

**TASKER** This is the most elaborate multitasking system yet devised for the PC. Install up to nine variable sized partitions, with a program running in each, and pop between them instantly.

**WINDOW** The source code for the C language window manager from the July 1987 edition of Computing Now! Written in Lattice C.

**\$19.95**  
**(FORMERLY VOLUME 26)**

**A F S P C 3 3**

**AC** This is a small area code program—give it a three digit area code and it will tell you where it is.

**ASC** This is a memory resident utility that pops up a window with an ASCII character chart.

**ATTR** This utility lets you meddle with the attribute bit of your files.

**BAC** This is a disk backup utility that is much less frightening than the one that comes with DOS.

**BACKSRL** This recalls stuff that has scrolled off your screen. It's neat if you can't seem to reach the Num-Lock key in time.

**CAT** This is a collection of disk utilities in one program.

**CLOCK** One of the nicest clocks we've seen, this has a built in alarm function among other things.

**COVER** This is a sorted disk directory that prints out all the files on a floppy in a form suitable for sticking to the sleeve.

**CWEEP** This is a menu driven file mover—saves typing the word COPY over and over again.

**DDIR** Yet another directory utility, this does a two column directory similar to the regular single column DOS version.

**DELZ** This wipes out files so they can never come back—kills the sectors as well as the directory entry.

**DISKAN** This one checks your disks for bad sectors—get 'em before they get you.

**DOORS** This lets you flip between multiple monitors without rebooting your system.

**EQUIP** This program tells you what hardware your system thinks it has—often providing you with the answer to many software problems.

**FASTDISK** If your floppies seem a bit tedious, you might want to zap 'em with this speed up program.

**FDATE** This changes the date stamps of files.

**FLIP** sets a number of otherwise tedious parameters under DOS.

**FREE** This returns the amount of free space on a disk without having to watch the whole directory scroll by.

**GERM** This is a memory resident interrupt driven communications terminal.

**IBMSHELL** This allows you to fool your system into loading COMMAND.COM from other places.

**KBBUFF** This is a keyboard buffer extender. No home should be without one.

**KEYFAKE** This allows you to "stuff" keyboard characters into an application to get past tedious introductory screens and menus.

**LC** This counts the number of lines in a text file.

**LOCATE** This scans through subdirectories, checking all the files for specific text strings.

**LOCK** This is a file encryptor. Also includes UNLOCK.

**MOVE** This moves files between subdirectories with less typing than COPY would entail.

**NDOSEDIT** An updated version of regular DOSEDIT, this is a resident DOS command line editor that actually makes DOS decent of work with. Indispensable.

**NO** This is a strange little wild card exception thing. It allows you to create more complex file specifications than does DOS all by itself.

**NPAD** This is a simple memory resident node pad.

**PCUTIL** This is a collection of add ons to DOS.

**PINHEAD** The printing press program from the June 1987 edition of Computing Now! It can get up to 16 kilobytes of text on one page. Includes the C source code.—works with Epson compatible printers.

**POPCAL** This is a memory resident utility which will bring up any month of any year you like.

**PR** This is a handy formatted printing utility.

**PUSHDIR** allows you to change subdirectories, do something, then return to the previous directory.

**REBEEP** A replacement for PAUSE, this is a noisy batch file utility to attract attention when a task has been completed.

**RENDIR** renames subdirectories.

**SCRN** blanks all the monitors attached to your system after a specified period of inactivity to keep your phosphor from getting fried.

**SETPRN** This allows you to painlessly set up your printer from DOS.

**SETUP** This is a memory resident utility that will allow you to set up an Epson compatible printer from within any application.

**SIZE** This returns the number of allocation clusters a file occupies on the disk.

**SOUND** makes noises to attract attention from within a batch file.

**SP** A nice little print spooler.

**SWEEP** This allows you to execute a 4command in every subdirectory on your disk.

**UNDEL** This recovers accidentally deleted files. You may not need it now but you sure will sooner or later.

**VDL** This requests verification before it deletes files so you won't need UNDEL quite as often.

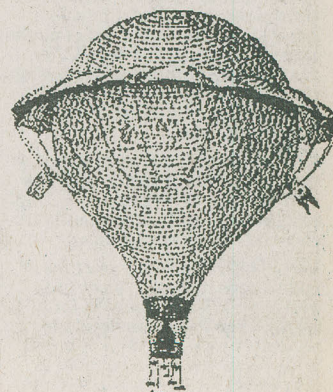
**VOLSER** Changes the volume name of a disk.

**WAITN** This pauses for a specified time while executing a batch file.

**WHEREIS** This finds files in subdirectories. It includes the C source code from the June 1987 edition of Computing Now!

**XDEL** This is a menu-driven file deletion utility.

**\$19.95**  
**(FORMERLY VOLUME 24)**





## A F S P C 3 2

**ARCE** A really tiny archive utility, this thing will extract members from ARC files without tying up half a disk for itself.

**BABY** An extremely warped game, this thing is engaging and fairly challenging none the less. It involves catching babies who are leaping out of a burning building.

**CHMOD** This is a useful utility for reading and changing the bits in a DOS mode flag.

**CITYDESK** This is an elegant fancy printing program that allows you to do some desktop publishing functions with a dot matrix printer.

**DOG** A disk organizer, Dog will defragment the files on your disks to make them quicker to access.

**FPR** This is a printing program written in C. It's not compiled — you can change it to meet your needs. Requires a C compiler.

**THRILL** There is little to say about this program. It's a beautiful example of high resolution PC graphics, and was too good to ignore, even if it was wholly useless. It's also a bit naughty.

**MIDI-IO** The source file for the interrupt driven MIDI communication module from the April 1987 edition of Computing Now! Requires MASM to assemble and a language compiler to use — preferably C.

**PC-WRITE** The latest version of this phenomenal word processor, this thing is enough to turn you off any other word processing package on the planet.

**EDWIN** This is a decent windowing program editor written in Turbo Pascal. It's not terribly fancy, but it's fast and very much like WordStar.

**\$19.95**  
(FORMERLY VOLUME 23)

## A F S P C 3 1

**BOTH** is a small utility which can slash your paper bill by allowing you to print long files on both sides of the paper.

**DIAGS** Written by the author of Z80MU, this collection of tools will be nirvana for the experienced PC programmer. It does things like generate an annotated list of all the interrupt vectors in your PC, let you meddle with the 6845 registers, test most of the ins and outs of your system and so on. It's a brilliant bit of work.

**GRCP** Graphic cut and paste is a memory resident tool that allows you to scoop things from a PC high resolution graphic screen and pop them into other applications.

**LOCKERUP** This tiny microbe of code sleeps in your system until you have to leave your PC for a while. Then it enables you to irrevocably lock up your keyboard until you come back to restart it. It's perfect for offices where there are more fingers than hands to contain them.

**MEGAPEDE** Just when you thought that it was safe to play ASCII games again... This one is a sophisticated variation of the classic "snake" programs and it plays with the speed of a boa constrictor. Don't count on winning for a while.

**MURPHY** Sort of an iconoclast in a can, this program will print a random selection of several hundred of Murphy's laws, corollaries and commentaries thereon each time it's run. If you put it in your AUTOEXEC file it will say something clever each time you start your computer.

**QUEBERT** This fast PC implementation of the classic arcade game is every bit as exciting as the real thing but lacks a coin slot. Jump down the mountain, avoid the snake and try not to get clobbered with fresh fruit. Sounds like real life...

**SAT** This is a powerful, menu driven satellite data download terminal, as discussed in the December 1986 edition of Computing Now!.

**SCAV** This is a great program for people who buy economical floppy disks and just about everyone else who can't afford a clean room for their PCs. It cruises through one's disks locking out bad sectors and restores previously 'fried' disks to usefulness.

**SimCGA** The utility does an astoundingly good job of making a Hercules graphics card behave like a colour graphics adapter. It will let you run most CGA software.

**STUFFIT** Stuffit is a disk management utility which stuffs files into the inner tracks of a floppy disk, allowing the outer tracks to be used for work space. This improves the disk access times and the reliability of mostly full disks considerably.

**\$19.95**  
(FORMERLY VOLUME 19)

## A F S P C 3 0

**ALTAMIRA** This is one of the nicest public domain paint box programs available for the PC. It does first rate pictures. Colour graphics card required.

**FRACTAL** This is the C source code for the fractal generator that first appeared in the August 1986 issue of Computing Now! Requires a C compiler and a colour graphics card.

**NEMON** This is a really weird game. You get stuck in the catacombs of king Nemon with nothing more than your wits and a flashlight. You have to find some keys, some treasures and, hopefully, a way around a host of arcade game nasties.

**THOR** used to be the god of thunder. Now he appears to be the world's most sophisticated desk calendar program for keeping track of appointments.

**ROUND 42** This is bizarre variation on the theme of space invaders. One of the best computer games in creation. Requires a colour graphics card.

**V20** is a CP/M emulator for users of the NEC V20 chip. Replace your existing 8088 with a V20, score this little program and most CP/M software will run on your system as if someone had stolen half the bits out of your PC. Regular MS-DOS isn't affected. Requires a V20 chip.

**\$19.95**  
(FORMERLY VOLUME 15)

## A F S P C 2 9

**MONOPOLY** A good implementation of the classic board game. Great graphics and sound.

**D20** is the latest version of Steve's sorted directory program. This one uses DOS two calls and handles subdirectories.

**EDIT** is a lightning fast full screen editor, ideal for editing program

source files, dBASE stuff or other ASCII phenomena.

**BANNER** takes mere text and prints it sideways on your printer — in gargantuan block letters that can be read from miles away if you have a good set of binoculars.

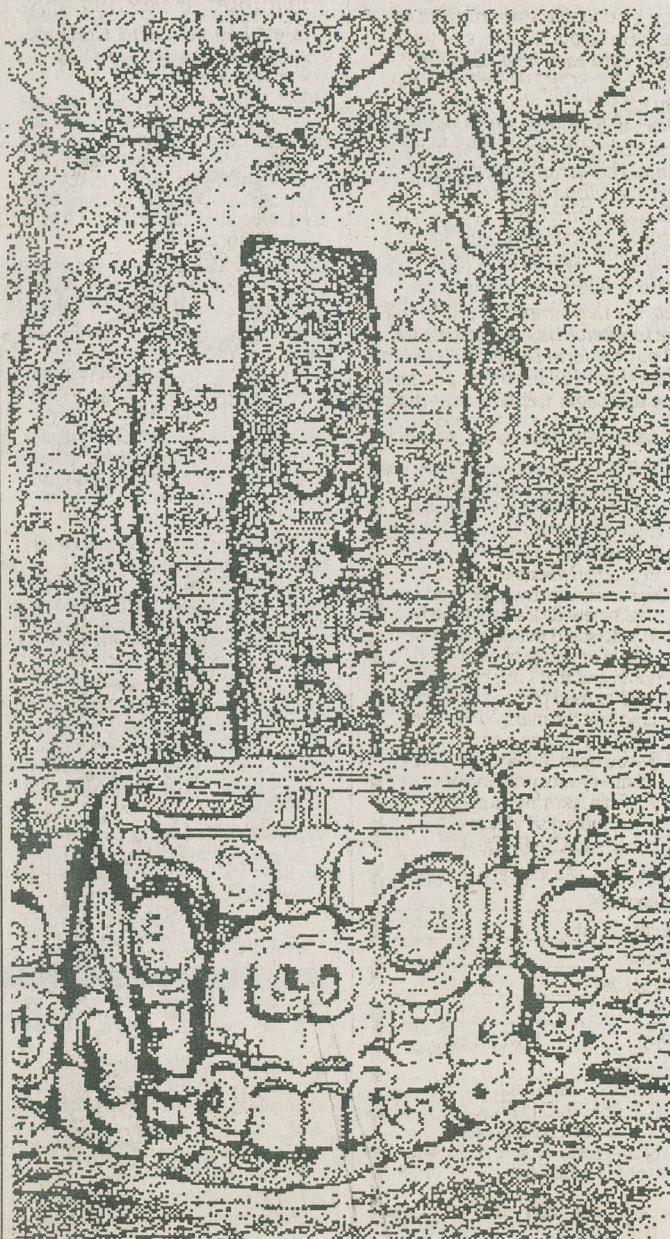
**MORTGAGE** is one of the nicest mortgage programs we've seen so far — lifelong debt and ruination has never been so well formatted.

**QUICK** speeds up your PC quite a bit by improving video response.

**SPEECH** is a rather remarkable little germ of code. It talks through the PC's internal squeaker speaker. The voice isn't exactly human, but it's understandable on most machines.

**PC-AR** is an accounts receivable package for the PC. It will take care of the records for a small or medium sized business quite well.

**\$19.95**  
(FORMERLY VOLUME 10)





*Yes, it's that simple. If you would like to receive this service, please fill out the form below and mail to Moorshead Publications. The service will begin with the next disk.*

**MOORSHEAD PUBLICATIONS**  
1300 Don Mills Road,  
North York, Ontario M3B 3M8  
(416) 445-5600 FAX: 416-445-8149

# INTRODUCING

We hope that **PERSONAL SOFTWARE NEWS** will interest you and make our disks a bit more useful to you and that you'll continue to enjoy Almost Free Software.

will interest you and make our disks a bit more useful to you and that you'll continue to enjoy Almost Free Software.

**P E R S O N A L  
SOFTWARE  
NEWS**

THE NEWSLETTER  
FOR PUBLIC  
DOMAIN  
SOFTWARE  
USERS

MARCH, 1989  
VOLUME 1,  
NUMBER 1  
NINETY-FIVE  
CENTS

Almost Free Newsletter

MARCH, 1989  
VOLUME 1,  
NUMBER 1  
NINETY-FIVE  
CENTS

# NEWS

## Completely Free Newsletter

... money if you like the thing. registers a

a lot more likely to write more ...  
You might ask how one gets  
... aware that's in the public do-  
... can't buy it from

cent high speed modem costs i  
the new neighborhood of a grand  
Thirdly, you have to downlo  
load programs... a lot of program  
We typically download a  
... worth of

Software Order Form .....  
New Almost Free Software .....  
GIFs From the Gods .....  
MacPaint for the PC .....  
Music Hash Churns .....  
Pink Slips .....  
Ventura Highway .....  
Comic Adventures .....  
Do the Envelope Challenge .....  
Virus Checkup .....  
Drinks All Around .....  
Filly Dink .....  
The Labours of Hercules .....  
Unfolding Surprises .....  
DCC Hipsters .....  
Bygone Your TSN's .....  
MacModem .....  
Murder Your Mouse .....  
Fear of COPY .....  
Authors, Authors .....  
Disk of the Month .....  
Talk to Me .....  
Financial Announcements .....  
Electrical Engineering .....  
No Pun Clip Art .....  
Questions & Answers

There's more to selling software...any sort of software...than just taking in money and shipping out disks. Recently, we had the opportunity to re-examine Almost Free Software to see how we could improve on it. Part of what came out of all the meetings, memos and general hash scratching that went on during the review was this newsletter.

Person. Software is intended to make our public-domain software disks a bit more useful and, we hope, a better value for you. We'll be offering you suggestions on how to use the software that's available from our software service, as well as expanded descriptions of the more involved packages... we know those little twenty-five word tags in the magazine ads are a bit thin sometimes. We'll also be telling you about programs you might not have known about if you've just gotten into *Almost Free Software*, things that we have in our older collections which are useful adjuncts to any system.

This newsletter is free to

As a rule, if you register a shareware program, you'll get phone support, updates and so on. The upside of using this sort of software is that you can try out the programs you want before you have to pay for them. In that

You might ask how one gets software that's in the public domain, if one doesn't buy it from us. We download it from bulletin boards. You can do this, too, if you want to save the twenty bucks we charge. However, there are several caveats to this. First of all, you have to pay

Thirdly, you have to download programs—a lot of programs. We typically download as many as eight megabytes worth of programs to get the four or five hundred kilobytes that finally make it onto a disk. The reality of the public domain is that a lot of the programs one finds in it are free because they're worth what they cost. Weeding out the slag is enormously time consuming.

Finally, you have to make sure that the system contains viruses, disk killers and other things that you should stay away from. We kept on top of these more and we're pretty good at it. We tell them before they nail you. We tell board operators before they don't check the code of the systems. Miss one program and your hard

may wind up a suitcase  
We're kind of pro-  
offer a few around all  
twenty dollars a pop  
Free Software disks take  
the adventure out of us  
puter, I suppose, but  
make the whole pro-  
deal easier. In a sense  
ing us to take care of  
grotty details for  
spent countless hours  
the cat screaming or  
gladly pay someone  
for the n

to do a  
In addition to  
good software, Al  
ware disks come  
If you don't like  
think that the dis  
isn't worth the  
buy it back from  
it for another d  
If you have qu  
of the program  
to answer the  
desk at (416) 4  
ness hours. T  
nicle in this m  
Use is ho

...ware News  
...make our d  
...to you and  
...enjoy Alms

Every time we mention a public domain program in this newsletter, you'll find a disk reference after it. For example, we might speak of MacScope (AFSPC 36). This tells you which of our disks the program in question is on. This will be the most recent version of the program, not unless there's some reason for it to be otherwise.

pretty obvious which  
we're referring to with it  
parenthetical women. H  
ever, you can order a  
simply by telling us the  
as it's found in these  
sources. Thus, if you  
want a large full color  
wide width

to contact us by phone, FAX,  
mail and request a subscription.

I'd like to explain a few things about Almost Free Software itself. Despite its constantly growing user base, I'm often surprised to find people who don't fully understand what they're buying.

The programs are either collected from the public domain directly, sent to the public domain authors or by us and placed in the public domain. The "public domain" is not a nebulous when one is talking about software. Strictly speaking, software is only that which is offered free of charge. The majority of programs in the public domain are the "shareware" programs. They are free, but they

ware, which almost never comes with any sort of a money-back guarantee... even if the program you're paid for doesn't work. It should be pointed out that when you send us twenty dollars for a disk, you aren't paying any shareware fees. If you like some of the programs on the disk, they are shareware; you're supposed to send their authors a few bucks. It'll make those authors

for access to the public domain bulletin boards that are worth having. Good ones run to about fifty dollars a year. We subscribe to quite a few of them in order to have a wide variety of programs on our disks. Contrary to what you might think, you don't get the same stuff on all boards. Secondly, you have to yourself a modern and learn a modern program.

up  
chairs

to use a  
isn't too common, although

If you have questions about any of the programs, we'll be pleased to answer them. Just call our desk at (416) 445-5600 during business hours. There's a separate article in this newsletter about that.

We hope that Personal Warfare News will interest you. We make our disks a bit more fun for you and that you'll come back for more.

— Eric S. Schwartz

Canada Post  
March 2003



# THE BEST OF ALMO

We've been offering our collections of Almost Free Software for over half a decade now. Recently we decided to weed out our catalog, deleting some of the older volumes. However, a few of the programs on each of the old disks were still pretty hot, and rather than consign them to the mists of eternity, we decided to gather the real classics together in

these compilations. Selected from over thirty volumes of Almost Free Software spanning about five years, these six disks represent the best of the best, programs which have withstood the ravages of time and even the changing versions of DOS. Every program on these disks have been extensively checked to

## BEST OF AFS1

**AREACODE** will tell you where any area code is.

**BACKSRL** retrieves text that has scrolled off your screen.

**BROWSE** lets you browse through text files.

**CASTLE** is an adventure game in an almost deserted castle.

**CAT** is a sorted directory program.

**CLOCK** is a screen clock. Includes ASM source code.

**D** is a tiny sorted directory program.

**DOSEEDIT** is a command line editor to let you recall previous commands and reuse them.

**FREE** shows you how much free space is on a disk. Includes ASM source code.

**HIDE** lets you hide and unhide sub-directories on your disk.

**JSB** plays a Bach minuet.

**JUMPOE2** is a pretty snappy arcade game. Requires a CGA or EGA card.

**MAGDALEN** plays music

**MEMBRAN** is a very flexible RAM disk program.

**MOON** lets you land on the moon. Requires a CGA or EGA card.

**NEWBELL** changes the sound of your PC's beep.

**PARCHK** finds out what's causing those nettlesome parity check errors. Includes ASM source.

**SOLFE** plays still more music.

**SURFACE** draws a complex mathematical function that looks like a hat.

**VDEL** is a convenient way to selectively kill multiple files.

**WHEREIS** locates files on a hard drive.

**WORLDMAP** draws a map of the planet.

**KEYCLICK** adds audible feedback to your keyboard.

**PC-BW** makes colour text programs readable on a monochrome monitor connected to a CGA card.

**PINBALL** simulates... you guessed it!

**SYSLOCK** helps prevent unauthorized access to your PC.

**VTREE** draws a map of your hard drive.

**WORLD** locates places on the globe for you.

**\$19.95**

## BEST OF AFS2

**BREKDOWN** is a travesty generator. It takes text files and makes new... if somewhat less meaningful... ones out of them.

**PACKGAL** is a great implementation of PacMan done entirely in ASCII and PC block graphics characters.

**ROUND42** is a lightning fast Space Invaders style game.

**SERIO** is a linkable serial driver for C language programs. ASM file only.

**V20** allows users with machines based on the NEC V20 chip to run CP/M software on their PC's.

**XMOD** is an implementation of XMODEM in C. Source code only.

**XWORD** translates text files between various popular word processors, including WordStar, MultiMate and SideKick.

**BANNER** prints up those large banners sideways along a strip of printer paper.

**K9** is a compendium of pop-up utilities all under one roof.

**MAP** shows you where everything is loaded in your PC.

**OMNI** is a first class text editor.

**Z80MU** emulates CP/M on a PC in grand style (for people without V20 chips). Run old software again.

**\$19.95**

## BEST OF AFS3

**ART** generates fascinating random screen art.

**HAUNT** is a first class little adventure game in a haunted house.

**LPTX** redirects your printer output to a disk file. Includes ASM source.

**PITFALL** lets you pilot a space ship as it plummets through a rather nasty cavern.

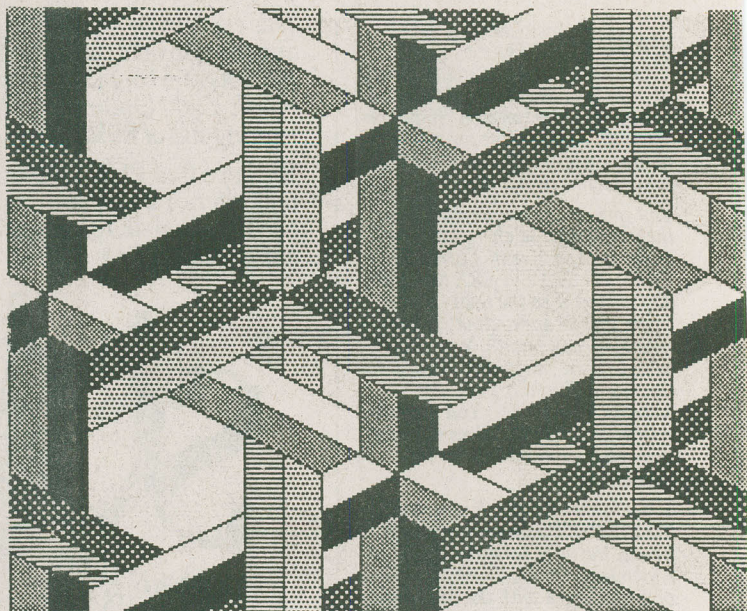
**RAMDISK** is a powerful, reconfigurable RAM disk program.

**BOTH** lets you print on both sides of your paper to keep your tree slaughter down.

**CARD** plays blackjack. C source included.

**HOTDOS** lets you pop out of an application, run other applications from a DOS prompt and pop back in.

**LINKFOUR** plays the popular Connect-4 game.



**LOCKERUP** lets you disable your system keyboard when you step away from your desk.

**MASTERKEY** is like the Norton utilities without the cost.

**MURPHY** prints out a different one of Murphy's laws with every execution. Kills more sacred cows than McDonalds ever will.

**PANGO** is a weird little arcade game if ever there was one. Kick the bricks and mash the bees.

**QUBERT** is a PC implementation of the popular arcade game.

**SIMCGA** lets you run CGA graphics software on a Hercules card.

**\$19.95**

## BEST OF AFS4

**ASEASY** is a nice Lotus 1-2-3 clone, a spreadsheet with most of the features but none of the copy protection.

**CACHE** caches your disk to improve the speed of disk accesses quite impressively.

**CAL** draws a calendar for the current month on your screen whenever you need it.

**CHESSII** plays chess using a first class graphic screen. Requires a CGA or EGA card.

**COREWAR** is the only true computer game. Try to crash the opposing computer.

**MIDIZAP** is a cheap 'n nasty tool for MIDI hackers.

**NANSI** is an ANSISYS replacement which offers more and better control sequences.

**PINBALL2** is another pinball simulator. Requires a CGA or EGA card.

**SCROLL** is a scroll lock enhancement.

**SHAREPCK** is a disk accelerator. Unlike a cache, this program tries to anticipate your disk accesses.

**SHELL** is a COMMAND.COM replacement which makes your PC behave like a Unix workstation.

**VIEW** is a high speed file browser for use with NANSI.SYS.

**BABY** is an arcade game in very bad taste. Catch the bouncing babies. (Let's hear it for bad taste.)

**EDWIN A** WordStar-like editor.

**FSDEBUG** is a full screen debugging program oozing with features.

**MIDI-IO** is a linkable C language module to give C programs communication capabilities for the Roland MPU-401 MIDI interface. ASM source only.

**SIDeways** prints wide documents sideways on an Epson compatible dot matrix printer.

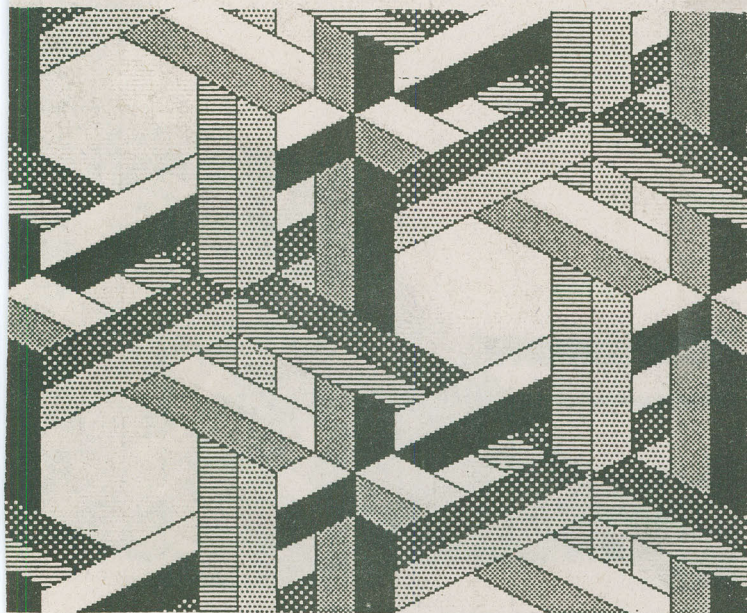
**\$19.95**



# ST FREE SOFTWARE

*make sure that it functions as it should and that it contains no viruses or other nasties. Most sources of public domain software do not provide you with this assurance. These disks carry the same promise that all our Almost Free Software does. If you don't feel that they're fair value once you've checked them out, we'll buy*

*them back from you with no gripes or questions. If you have problems with one of our disks, our help desk is as near as your phone... just call (416) 445-5600. If you're not already receiving it, please call us and ask to be put on the mailing list of Personal Software News, our newsletter. It's free.*



## BEST OF AFS5

**EGAFONTS** will change the screen font on an EGA or VGA card. Several are included.

**BADCLUST** will see if there are any bad clusters on a floppy before you find them the hard way.

**CCC** prints C source code with some of the most powerful formatting features imaginable.

**COLORS** lets you define the palette of an EGA or VGA card.

**CYLON** makes the cursor of your PC... strange. Requires an EGA or VGA card.

**DISPFNT** shows the current font of an EGA or VGA card.

**HGCIBM** allows you to run some CGA graphics software on a Hercules card.

**KC-PAL** is a palette tool for EGA and VGA cards.

**MBS** allows you to switch between multiple tasks running on your PC at once.

**PC-RR** simulates a railroad on your PC. You lay out the track, control the trains and get to play engineer. Many sample railroads are included.

**ASTROLAB** is a package which works out the details of planetary relationships for astrologers.

**DECEIVE** pops up a serious looking screen on your PC at the touch of a key should the boss walk in.

**DPATH30** helps applications with overlay files find them even if they're in alternate subdirectories.

**HXC** is a hexadecimal calculator.

**IOMON** lets you see what your disk drives are doing from moment to moment.

**LW86** is a pop up help window for assembly language programmers.

**VMUSIC** plays three voice music with great finesse. Several tunes are included.

**ZANSI** is another ANSI.SYS replacement, this time with more features and higher screen writing speed.

**\$19.95**

## BEST OF AFS6

**ALTER** lets you change the attributes of files.

**CALENDAR** creates a calendar for any month of any year from the middle ages until star date 14593.3.

**CHINASEA** is like a James Clavell novel in a program. Buy, sell, trade and try not to get stabbed.

**COVER** prints up the directory of a disk in a form suitable for stashing in the sleeve.

**DISKLITE** is a software drive light. Great for RAM disks and hard cards. The source is included.

**HELP** brings up a synopsis of the most common DOS commands and their uses.

**INSTACALC** is a pop up spread sheet of impressive capabilities.

**MELT** clears the screen of your computer... oddly.

**MONSTER** lets you step through applications one DOS call at a time to see how they work.

**NOREBOOT** disables the Ctrl-Alt-Del reboot of your machine. Includes ASM source.

**TMAP** is a resident program to let you see what's happening in memory.

**VARISLOW** lets you slow your machine down to play games on an AT or 386 system. ASM source is included.

**386BUG** lets you find 80386 processors with the legendary math bug that plagued some of the early chips. Source included.

**AC** finds area codes. C source is included.

**ASC** pops up an ASCII chart.

**AT** lets you run programs at predetermined times in the future.

**ATTR** changes file attributes.

**BAC** lets you back up your files.

**BACKSCRL** recalls screen data that has scrolled away.

**CAT** is a directory program.

**CLOCK** is a screen clock.

**CMOS** lets you save and restore the contents of the CMOS memory of your AT or 386 based machine.

**DDIR** is another sorted directory program.

**DELZ** wipes out files completely so they can't be recovered and read behind your back.

**DISKSCAN** checks out your disks.

**EDISK** creates a 128K RAM disk in otherwise unused memory space. ASM source included.

**EQUIP102** determines the equipment complement of your machine...as your software sees it.

**FASTDISK** speeds up disk accesses.

**FDAT** is a more convenient way to set the date.

**FLIP** sets a number of parameters of DOS conveniently.

**FREE** tells you how much disk space you have left.

**G** lets you assign aliases to your subdirectories.

**GDIR** is a sorted directory program which uses Hercules graphics to get more file names on the screen.

**KBBUFF** increases the size of your keyboard buffer.

**KEY-FAKE** lets you "stuff" keys into an application before it boots up.

**LC** counts the number of lines in a text file.

**LOCATE** finds text strings in files over multiple subdirectories.

**LOCK/UNLOCK** encrypts and decrypts files.

**MOVE** moves files around

**NDOSEDIT** is the latest version of the popular command line editor. Features aliases.

**NO** is a way of filtering wild card command line specifications.

**NPAD** pops up a resident note pad program.

**PINHEAD** prints on an Epson printer very, very small. C source is included.

**POP-CAL** pops up a calendar for any month you like.

**PUSHDIR/POPDIR** lets you save your current directory position in batch files.

**PR** is a print formatting utility.

**REBEEP** is a replacement for PAUSE in batch files. Beeps.

**RENDIR** lets you rename subdirectories.

**SCRN** is a screen saver.

**SETPRN** sets up your printer from DOS.

**SETUP** is a pop up Epson printer controller.

**SIZE** tells you how much disk space a file occupies.

**SOUND** makes noises to attract attention from within a batch file.

**SP** is a really nice print spooler.

**UNDEL** undeletes files on floppies.

**VDL** is a verified delete command so you don't need UNDEL as often.

**VOLSER** lets you set the volume label of a disk.

**WAITN** waits for a specified time.

**WHEREIS** locates files. C source included.

**XDEL** is a menu driven file deletion program.

**\$19.95**



# THE EXECUTIVE

If you own a PC, XT or AT compatible microcomputer, you'll probably have heard about the power and economy of low cost public domain software and shareware. However, if you've ever tried to make sense of the thousands of cryptic programs available in the public domain, you might well have abandoned all hope of any of it ever being of much use to you.

We'd like to introduce you to our Executive Software Series... no fuss, no risk software. We'll make your computer dance... with no piper to pay. We sort through six to eight megabytes of public domain software to create one of these collections. We weed out the programs which don't work properly, the ones which just aren't suitable for business applications and the ones which contain computer viruses.

## EXECIO

**PC-AREA** is the last word in telephone area code programs. Hit the alternate key of your choice and it pops up a window with all the provinces and states in North America, along with a comprehensive area code finder. Let your fingers hoof it in style.

**FREEFORM** is a data base manager for people who *don't* want to mess about with dBASE. It creates a free form data base which is easy to use, requires no set up and can be keyed by a trained chimp.

**STACK** is a DOSEDIT replacement from Australia. It keeps a stack of your previous command lines, plus it has a handy pop up window which lets you see all your previous commands at a glance.

**CREDIT** is a credit card manager, suitable for use in business or to keep track of your personal finances. It helps you refrain from spending yourself into oblivion. Don't leave home without it. Requires Microsoft Windows.

**VIEW2** is a file view program with schizophrenia. It lets you scroll through two files side by side, allowing you to compare them or just to work with two documents at once.

**DUSTY** is the last word in Ventura Publisher style sheet utilities. It will create an exhaustive analysis of any style sheet. If you use Ventura you won't want to miss this one.

**RETPLAN** is an RRSP and annuity planner and calculator. It lets you see just how much you'll retire with based on your annual contributions. It's one of the last ways going to get something past the government.

**\$19.95**

## EXEC9

**ASCI** is a great resident program for applications which require that you enter extended character codes into them. Rather than having to remember what the code for a U with an umlaut over it is, just pop up this window and select it from a table. Great for word processing.

**DRAFTC** is like AutoCAD without the price tag... and it doesn't need a math chip. This is a complete drafting package with pull down menus, mouse support and lots of features. It's great for applications

in which you don't need all the power of a high end drawing program. Requires a mouse.

**TRICAL** is the most sophisticated pop up calculator program yet devised. Outthinking SideKick and all the commercial calculators, this one will do things even real calculators can't get together.

**CLIP** allows you to extract sections of GIF files and make them into new, smaller GIF files. It's a great tool if you use our POSTGIF program to create desktop publishing clip art from GIF files.

**FREEMEM** is a dandy little Windows program which puts a window on your screen to tell you the current amount of free memory available to your applications. No computer should be without one. Requires Windows.

**SUBMIT** is an instant batch file. It allows you to run multiple commands at one time from the DOS prompt simply by separating them with colons. An essential gadget, this.

**TIME** puts a digital clock into a Windows screen. It takes up a lot less space than the one with hands does, and it looks slick. Requires Windows.

**TODDY** is a DOSEDIT replacement. It adds a sophisticated command line editor to DOS to allow you to recall and edit previous commands. Saves buckets of typing and uses WordStar editing commands.

**\$19.95**

## EXEC8

**ASEASY** is the latest version of the Lotus work-alike spreadsheet package. Featuring no copy protection, macros, pull down menus and more, ASEASY is the slickest piece of business shareware available.

**BAK** will visit every subdirectory on your hard drive and automatically kill off all your BAK files, freeing up countless megabytes of drive space.

**BOOKMAKE** uses an Epson compatible printer to format up text so it looks like book pages. Makes your reports more readable, and saves paper.

**IBM\_SCRN** is a downloadable character set for an Epson compatible printer which features all the high order graphics characters which you see on your screen but never find on your screen dumps and print outs.



**JOT-IT** is the slickest, most sophisticated resident note pad program yet written. Keep your memos, your notes and everything else you need handy.

**NOYB** stands for "none of your business". It allows you to blank your screen whenever you leave the room. Once blanked, only you can restore it.

**PCDC** is a complete and extremely powerful database manager for handling flat file databases. User programmable fields, full screen editing, import and export facilities and sophisticated searching.

**POSTGIF** is the most recent version of our popular desktop publishing utility. Converts GIF files into high quality halftoned clip art for use with Ventura, PageMaker, etc. This one allows for variable size screens.

**QCRT** speeds up the screen updating for most systems quite noticeably. Applications which formally took their time printing will shift into warp drive.

**SPEED** also speeds up the screen of your system. This one has been fine tuned for EGA cards, however, for even more of a boost. Requires an EGA or VGA card.

**SS** is a spelling checker very similar in operation to the Webster's New World Spelling Checker. It's fast, easy to use and should be mandatory for anyone who writes memos, reports or business letters.

**THESAURUS** helps you find better words to write with. Given any word, it will suggest other words which mean the same thing. Helps make your writing more interesting and, as such, more likely to get read.

**\$24.95  
(TWO DISK SET)**

## EXEC7

**DECEIVE** is designed to save your job in the event that someone in authority pops in unexpectedly. Allows you to copy any screen from a business-like application and instantly pop it up over your video game, resume or other incriminating effort.

**INVOICER** is a complete inventory management, accounts receivable and invoice generator package. Will manage most small to medium sized inventory and invoicing applications with power to spare.

**LM** is the hottest label maker and mailing list management package we've encountered. Whether you use mailing to generate sales leads or just mail out club newsletters, having the mailing list in house makes your responses more cost effective.

**KDCG** is an elegant calculator program. Runs from the DOS prompt and provides a calculator that's as close to a real one as you can get. Requires an EGA or VGA card.

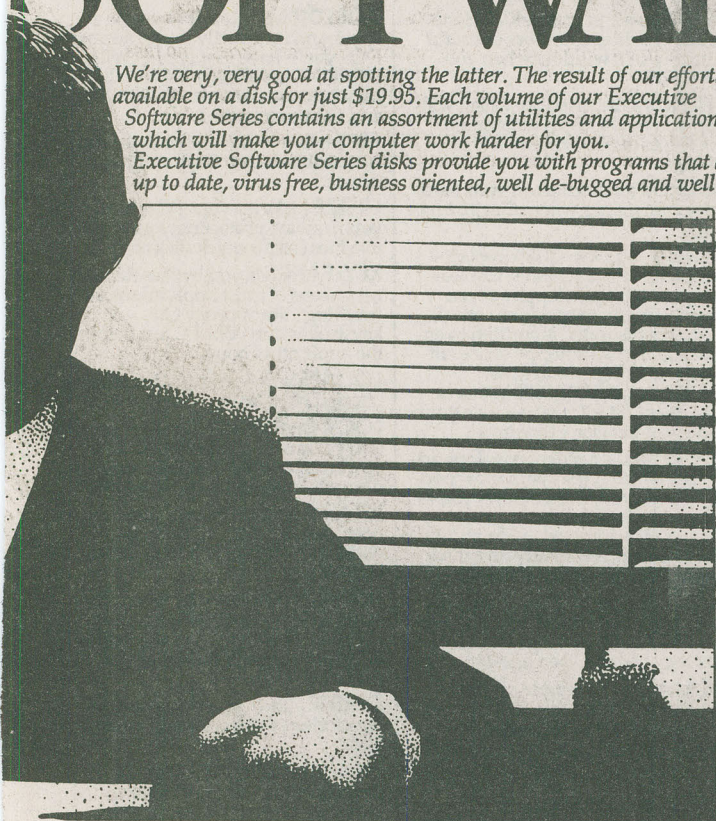


# SOFTWARE SERIES

We're very, very good at spotting the latter. The result of our efforts is available on a disk for just \$19.95. Each volume of our Executive Software Series contains an assortment of utilities and applications which will make your computer work harder for you. Executive Software Series disks provide you with programs that are up to date, virus free, business oriented, well de-bugged and well

supported, and a complete volume... typically, one or two dozen separate business programs... costs less than a good lunch.

Finally, every Executive Software Series collection carries our promise of satisfaction. If you don't think it's fair value, we'll buy it back from you for every cent you paid for it.



**PHONES** maintains a list of telephone numbers for you. If you have a modem, it can even dial them for you. Requires Microsoft Windows.

**POPDBF** is ideal for anyone who uses dBase, Clipper, Foxbase or any dBase compatible packages. It's a pop up window which allows you to browse through any DBF file from within any application.

**MINDREADER** is a word processor for people who can't type. As you type, it uses artificial intelligence to guess what you'll type next. If it guesses correctly, you can have it insert the next word or words for you. If not, just keep on typing.

**ONEKEY** is an elegantly simple keyboard macro program which takes up almost no memory, is easy to program and holds up to fifty macros. Better than ProKey for a fraction of the cost.

**\$24.95  
(TWO DISK SET)**

## E X E C 6

**INSTANT NETWORK** Using a simple serial cable, this package will network any two PC's together. You'll be able to share files, share peripherals and have all the advantages of a small local area network.

**LASER FONT EDITOR** is a LaserJet laser printer soft font editor. It's mouse and menu driven, and includes special effects such as drop shadows and outlines. Requires a Microsoft compatible mouse.

**BS** We won't tell you what "BS" stands for in this case, because we're sure you can work it out for yourself. Creates very meaningful sounding but very meaningless text. The ultimate inter-office communicator.

**FILE FINDER** Faster and more flexible than Norton's FF utility, this program will find any file or group of files on your hard drive. Has many options to help you fine tune its search capabilities.

**EGA RULER** is for anyone who uses an EGA or VGA card. It will pop a text ruler over your work to help you line up spreadsheet columns, adjust your letters to fit your letterhead and so on.

**WINDOWS FINDER** is a Microsoft Windows application. Will locate files anywhere on your hard drive, a Windows equivalent to the DOS file finder above.

**INTEREST CALCULATOR** is a great little loan calculator. Given the principal, interest rate and payment size of a loan, it will print up a table to tell you how long your indenture is going to last. Give it a fixed term and it will calculate the payments, etc.

**INVENTORY** should be on every

computer on the planet. It helps you keep track of the contents of your home or office, providing you with a running count of the replacement cost of your assets.

**JDOS** allows you to pop a DOS command line up from within most any application... even if your application doesn't have a DOS SHELL facility. Will give you a full house of memory to run programs in, not just what's left over by your first program.

**NOTE** is a browse program which runs as a pop up utility. Allows you to read any text file from within another application and it only ties up a few kilobytes when it's hiding in the background.

**\$19.95**

## E X E C 5

**DERASE** is the best file un-erase program we've encountered. It works on all formats of floppies and hard drives up to thirty two kilobytes, and recovers most accidentally deleted files.

**LETTERS 'N LABELS** is a mailing list manager for moderate size mailing lists. Manages your lists, let you update and edit them and print out labels. It costs less than the courier to a mailing house.

**LASTRESORT** gets you back to DOS, and usually allows you to save your files, when your computer hangs. It can save you hours of work that might otherwise have been lost to bugs or static shocks.

**800K** allows you to format normal dual density 360K floppies to hold eight hundred kilobytes in the high density drive of an AT compatible computer.

**WMF** manages a portfolio of mutual funds... diligently. Allows you to edit and update your portfolio, print reports and even see detailed graphs.

**MONEY WATCH** is an elegantly simple money management program which is equally useful at home, for small businesses and for handling the finances of individual departments of larger businesses.

**\$19.95**

## E X E C 4

**CALCQF** Speed up your computer... possibly by several hundred percent... with no tricky hardware changes. Calculates how much of a

speed increase you can realize and then sets up your machine to do it.

**CONFMT** allows you to format disks in the background while you're performing another task.

**FM** is a menu driven file manager. Copy, move, delete and generally meddle with your disk files, without typing commands.

**FORMATQM** formats lots of floppies very, very quickly, and is a worthwhile companion to CONFMT, above.

**FINANCIAL PARTNER** provides you with a variety of handy financial planning tools. Work out loans, annuities and other money matters with blinding ease.

**HERCSAVE**, for anyone using a Hercules compatible graphics card, blanks your screen after a set period of inactivity to avoid burning out your screen.

**INSTACALC** is a spreadsheet in a can. It's memory resident, and you can pop up a full blown spreadsheet program, complete with macros and all the trimmings, from within any application.

**JETLAG** helps you calculate how long you should be prepared to take it easy after a long international airplane journey.

**MEMO** will print memos with the word "MEMO" at the top in special effect characters. Requires a PostScript printer.

**MURPHY** helps keep your sanity by printing, from the AUTO EXEC file, a different clever thought every morning.

**PINPRESS** prints up to sixteen kilobytes of text on a page. Great for making archive copies of large documents. Requires an Epson FX-80 compatible printer.

**POPDS2** is a pop up utility which will handle your files and directories effortlessly from within any application.

**QUICKCOPY** is a replacement for the DOS DISKCOPY command. It duplicates disks in half the time or less, and makes multiple copies even quicker.

**TED** is the worlds smallest text editor. Use it for creating batch files, quick notes to yourself and other instant files.

**ZAPDIR** kills off subdirectories with one command... even if there's still something in 'em. Saves on manual deleting.

**UNWS** is a quick 'n nasty filter to turn WordStar files into text.

**\$19.95**



# EXECUTIVE SOFTWARE DISK OF THE MONTH CLUB

New Executive Software Series disks will be appearing roughly once a month. If your day is too full to allow you the time to order these disks, we offer you our Disk of the Month Club service. Join the club, provide us with a credit card number and we'll automatically ship you each new disk, billing your account. If you don't want to keep a disk, simply return it and we'll credit your card account. This service places you under no obligation... you can cancel it whenever you no longer need it. All club members will receive disks at the rate of \$19.95, or 29.95 for two disk sets, for twelve calendar months, regardless of any price increases which may occur within this period.

To get on line with the Executive Software Series Disk of the Month Club, contact us by letter, phone or FAX, or simply use the coupon below.

YES, I want to be part of the Moorshead Publications EXECUTIVE SOFTWARE DISK OF THE MONTH CLUB. By completing this order form, I authorize Moorshead Publications to charge my credit card for each new disk as published. I understand that there will be approximately one disk per month and that I will be charged the advertised price. I also understand that the maximum charge for any disk will be \$30.00 (Moorshead Publications is not planning any price increases. This takes into account double disk volumes).

Charge my Credit Card

Visa MasterCard AmEx

Account# \_\_\_\_\_

Expiry Date \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

Prov. \_\_\_\_\_ Postal Code \_\_\_\_\_

Signature \_\_\_\_\_

Send to:  
MOORSHEAD PUBLICATIONS  
1300 Don Mills Road,  
North York, Ontario M3B 3M8  
(416) 445-5600 FAX: 416-445-8149

## E X E C 3

**CLEARCUT** will make your writing more readable by helping you to spot excessively large or difficult words.

**CALLFOR** is the pop up equivalent of pink message slips that litter most offices.

**SHFTPICK** allows you to skip over the loading of resident programs when your computer boots up.

**SMOOTH** is a text "browsing" program. Lets you read documents by scrolling. EGA or VGA card required.

**VALET** is a DOS shell allowing you to use simple menus rather than complex typed commands to handle moving files, changing directories and so on.

**WIPE** will obliterate every trace of a file. Essential for sensitive data.

**YEARCAL** prints up a calendar for any month of any year in the twentieth century... in sixteen languages.

**ASEASY** is a powerful spreadsheet package, in many ways the equal of Lotus. Small, fast and not copy protected.

**BANNER** prints up any phrase you like as a huge banner lengthwise along a strip of printer paper.

**CALENDAR** is a desk calendar and daily planner with lots of options. Much harder to misplace than the paper kind.

**COVER** prints the directory of a floppy disk so that it slips into the disk sleeve as a reminder of what's on the disk.

**DISKLITE** is for people with machines that have internal hard drives and hard-cards. A flag in the corner of the screen tells you when the drive is running.

**PALERT** warns you when you're running out of disk space, saving you from a computer full of work and no way to save it.

**BOTH** lets you print long text files on both sides of the paper.

**LOCKERUP** lets you lock your keyboard instantly when you're not there, protecting it from unauthorized access.

**\$19.95**

## E X E C 2

**BCOPY** is a replacement for the DOS COPY command which copies files as a background task. As soon as you let it go, it returns you to the DOS prompt so you can get back to what you were doing.

**BELL** makes the beep in your PC sound like an electronic phone.

**NJFRERAM** tells you how much free memory is left in your machine from minute to minute, even when you're inside an application.

**CASE** will convert text into all lower case, all upper case, capitalized words and it'll even clean up WordStar files.

**MAXI** is a disk formatting program

which will allow you to get four hundred kilobytes on a regular 360K disk, or almost a megabyte and a half on a quad density disk.

**POPCALC** is a handy four banger calculator which pops up in a window whenever you need it.

**TONTO** is a sort of SideKick clone which provides a number of useful functions in a window when you call it forth.

**VFILER** is a file manager which will help you move, copy, rename and delete lots of files without lots of typing.

**WHEREIS** locates files on your hard drive... no matter where they're lurking.

**MCOPY** is a DOS COPY replacement with lots of features. Copies files over multiple floppies if you have too many to copy onto one. It uses a sophisticated algorithm to ensure you use your floppy space efficiently. It's a replacement for BACKUP and RESTORE in this case. Also does CRC checks to ensure your important data isn't corrupted.

**ADDRESS** is a resident envelope addresser which works with most popular word processors. Allows you to roll an envelope into your printer and have it addressed automatically. Will also print a specially designed graphic return address if you like.

**VCHECK** protects your system against computer viruses. It checks sensitive files in your computer to make sure they haven't been infested.

**SETALARM** is a simple memory resident reminder that will beep at you at a pre-arranged time.

**SILENCE** kills the speaker in your PC when you don't want to be beeped.

**VTREE2** is a new version of the VTREE program on Volume 1. Maps out the tree structure of your hard drive telling you how much space each directory occupies.

**WORLDTIME** will tell you the correct time in any city in the world.

**\$19.95**

## E X E C 1

**XWORD** translates text files created by one word processor into files compatible with others. Supports WordStar, WordStar 2000, XYWRITE II Plus, WordPerfect, Multimate and SideKick.

**BANKER** will help you balance your checkbook... as much as anything short of divine intervention really can.

**APPBK** is a memory resident appointment book.

**BROWSE** lets you scroll back and forth through text files like a word processor without waiting for one-EZo Zoboot up.

**CARDFILE** is a memory resident address book you can pop up from within any application. Even dials your phone.

**DCACHE** is a "disk cache". Installed, it will speed up just about any program which uses your hard drive frequently.

**DELZ** The DOS DEL command doesn't completely destroy the con-

tents of a file, and potentially sensitive files can be brought back without your knowing it. DELZ destroys all trace of a deleted file.

**DIRNOTES** allows you to affix notes and comments to any file on your hard drive.

**DOSEdit** is a must. If you type a command incorrectly under normal DOS you'll have to retype it. With DOSEdit installed, you can call back previous commands, edit them and use them again.

**FREE** tells you how much free space is available on any floppy or hard drive.

**FREEZE** locks up your PC while you're away, protecting your sensitive files from a quick disk copy.

**KEY-FAKE** lets you bypass the start up screens of most applications by "stuffing" the appropriate keystrokes into your PC just before the application boots.

**LOCATE** will find any file on a complicated hard drive.

**LOCK and UNLOCK** allow you to encrypt sensitive files so that only you can get at them. Works with text files, spreadsheets, data bases, etc.

**NPAD** is a small, memory resident note pad you can pop up from within any application to jot things down on.

**POP-CAL** is a calendar which can be popped up from within any application. Shows you a correct calendar page from any month of any year from 1582.

**RENDIR** allows you to rename sub-directories as you currently rename files.

**RN** shows you a map of the sub-directories of your hard drive and allows you to change directories by simply pointing to the area you wish to log into.

**SETUP** sends control codes to your printer. It allows you to change fonts and effects without having to remember scores of obtuse escape sequences.

**SNIPPER** copies the contents of any text screen into other applications. Extract part of a spreadsheet and pop it into a report being set up on your word processor.

**SWEEP** lets you execute any command you like in every sub directory of your hard drive.

**TSR MANAGER** is a collection of utilities which will keep your pop up utilities, resident programs and other TSR's from rising up to consume you. Also includes utilities which will help you identify TSR conflict problems.

**VTREE** is another of those essential little programs. It draws a map of the subdirectories of your hard drive.

**CONFIG** allows you to change the way your CONFIG.SYS behaves when your system boots up. Exclude specific drivers or commands to free up memory.

**READRITE** allows you to analyze how readable your writing is... as you write it. It pops up from within your favourite word processor and produces a readability index of the screen contents.

**\$19.95**



# LASERART

## PROFESSIONAL DESKTOP PUBLISHING CLIP ART FOR THE PC



If you use desktop publishing, you'll know that having some electronic clip art around is a quick way to liven up otherwise dull text. Unfortunately, due to the considerable size of really high resolution clip art, most of the images that are available in clip art libraries are fairly small. Getting a full page graphic together is very difficult.

Our first collection of Almost Free Laser Clip Art addresses this problem with over a megabyte of high resolution, black and white three hundred dot per inch images. They're kind of huge, but they're also extremely attractive when you integrate them into documents. We've tried to create a collection with something for every application.

These files are provided for the PC in the GEM/IMG file format, suitable for pouring directly into Ventura Publisher documents. However, we've also included our flexible ICON image conversion program with the collection to allow you to convert them into PC Paintbrush and TIFF files for other applications. They're suitable for use with virtually all professional PC based desktop publishing systems.

This collection is available for \$19.95 on a single quad, 1.2 megabyte floppy (AT or 386 system required) or for \$31.95 on multiple dual density floppies.

## AFLASERART1

- CHUCK**  
a woodchuck
- JUNGFRAU**  
Victorian etching of a girl's face
- ANCHOR**  
and a mermaid
- BEACH**  
fun at the beach
- LADYMOON**  
a fairly famous etching
- NEPTUNE**  
the ocean god, fork and all
- MOORING**  
a still life of a lake
- PIRATE**  
argh, Billy...ye've been 't sea?
- MOUSETRP**  
a very elaborate mousetrap
- CHEF**  
a chef with a fondu pot
- WABBIT**  
a rodent on the run
- FATCAT**  
an obese feline
- ROBIN**  
real robins dream of being this detailed
- SKYOCEAN**  
a world map
- DOG**  
a really cute little dog
- STAGECH**  
a cartoon stage coach
- REVELE**  
a bugle
- OLDLION**  
a bespectacled king of beasts
- SCARECRW**  
former resident of Oz
- CASTLE**  
a fanciful medieval cottage
- \$19.95**

# ALMOST FREE GIF USERS KIT

The incredible popularity of our GIF file colour clip art collections has prompted us to assemble this toolkit of programs for people who buy our GIF disks. It contains more and better programs than we've been able to include on the GIF disks themselves due to space constraints.

If you've bought one of our GIF collections, please check out this disk. It will make your GIF files a lot more interesting and quite likely a lot more useful as well.

This collection comes on two dual density floppies. It also includes several sample GIF files.

**VGACAD** is a public domain GIF paint program. It allows you to edit and even create your own two hundred and fifty-six colour GIF files. This is a first class package, and a lot of fun. Requires a mouse and a VGA card.

**CSHOW** is the best GIF file viewer yet written, and this is the latest version of this powerful package. It features panning over large files, a directory selection menu, loadable support for super VGA modes, colour palette adjustment and all the bells and whistles you could ask for. Note that this is a much more advanced version of CSHOW than was included with earlier GIF collections.

**GIFTOPCX** and **PCXTOGIF** will convert between GIF and PCX file formats, allowing you to edit your GIF files with PC Paintbrush, as well as importing them into applications which support the PCX format. These packages support

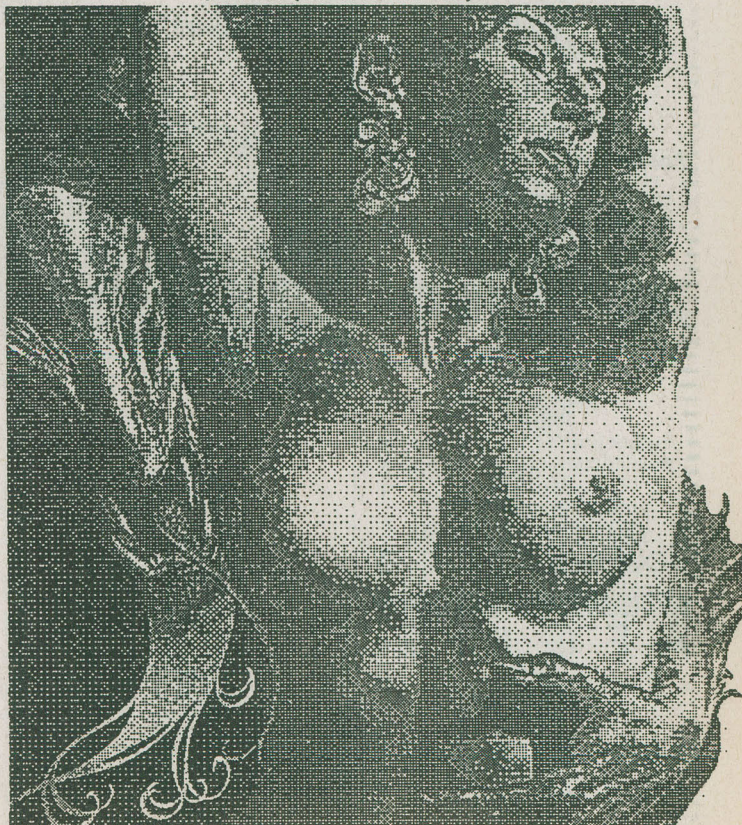
both conventional PCX files and the news two hundred and fifty-six colour PCX version four format.

**POSTGIF** allows you to create encapsulated PostScript files from full colour GIF files. These EPS files produce halftoned black and white images when printed. You can optionally include an EPS preview file, making this utility a perfect way of generating screen graphics for importation into desktop publishing packages such as Ventura. Requires a PostScript printer for output.

**GIFPUB** will dither GIF files down to black and white PCX files, suitable for use with desktop publishing software such as Ventura. The results are extremely good, and dithered art can preserve an amazing amount of the original GIF files it came from.

**GIFWP** converts GIF files into Word Perfect compatible graphics files.

**\$24.95 (TWO DISK SET)**





## A F G I F 1

## DRAGNLDY

This is the most amazing computer graphic you'll probably ever see, as well as being a fabulous piece of art. It's a lady and her pet... and her tatoo. (Note that this file is too large to fit on a single 360K floppy. If you buy the 360K disk set, we'll include a 50% scaled version of it.)

## VARGA

One of the original paintings by Varga, a lady and a phone. A portion of this image is reproduced in this catalog.

BABOON A colourful mandril.

## BLADERUN

A scene from the film Blade Runner, back when Harrison Ford was a lot younger.

## BODE1

A seductive little wench from the pen of the late Vaughn Bode.

## DESTRO

The star destroyer from Star Wars. May the force be with you and with all your pixels.

## DOLPHN

A painting of two dolphins.

## DRGN

A pretty evil looking dragon.

## FRUIT

A still life in phosphor.

## KINGTUT

The death mask of the boy king, the face that launched a million T shirts and coffee mugs.

## LIGHTS

Night time.

## MONKEY

A photographic quality reproduction of a Rhesus monkey. At least, I think it's a Rhesus monkey.

## MOUSE

A mouse... again, in amazing resolution.

## OPTIC1

An optical illusion.

## PEPPER

An album cover, digitized and looking nostalgic.

## SHORTS

A girl in cut off Levi's. Honest... they made me do it.

## STEPH

A girl in a T shirt. It's appalling how thin they're making T shirts these days.

## TALLSHIP

A clipper ship.

## TURNER1

A painting by Turner.

## TURNER2

Another painting by Turner. Both of these are pretty nearly photographs.

## UANGEL

An angel and a unicorn.

**QUAD DISK \$19.95**  
**FOUR 360K DISKS \$31.95**

## A F G I F 2

## APRIL

A calendar girl

## AZTEC

A mural

## BEATLES

You remember!

## BRONZE

A sculpture

## CEZANNE

A self portrait

## CIRCUIT

A circuit board

## EARTH

A well known planet

## LIPS

Ahh... lips

## NEST

A bird in flight

## P2NUD2

A woman.

## PARROT

A bird not in flight

## SAX

The instrument

## SURFER

Man, board, tube

## THISTLE

A seed pod

## WHALES

...and ruins.

## FRAISE

French strawberries?

## GLASS

from the twilight zone

## BEE

An insect

## DOGS1

Actually, only one.

## CATS10

2 cats, 1 hat, no ham

## GORILLA

A famous image.

## TETCHA

A dusky maiden

## A F G I F 3

## ANGELA

A girl named Angela.

## APR89

Woman and machete

## TECH

Chrome plated woman

## BALLOON

A hot air balloon

## BOUQUET

Flowers

## COMDISK

A compact disk

## DRHOUS

A dream house

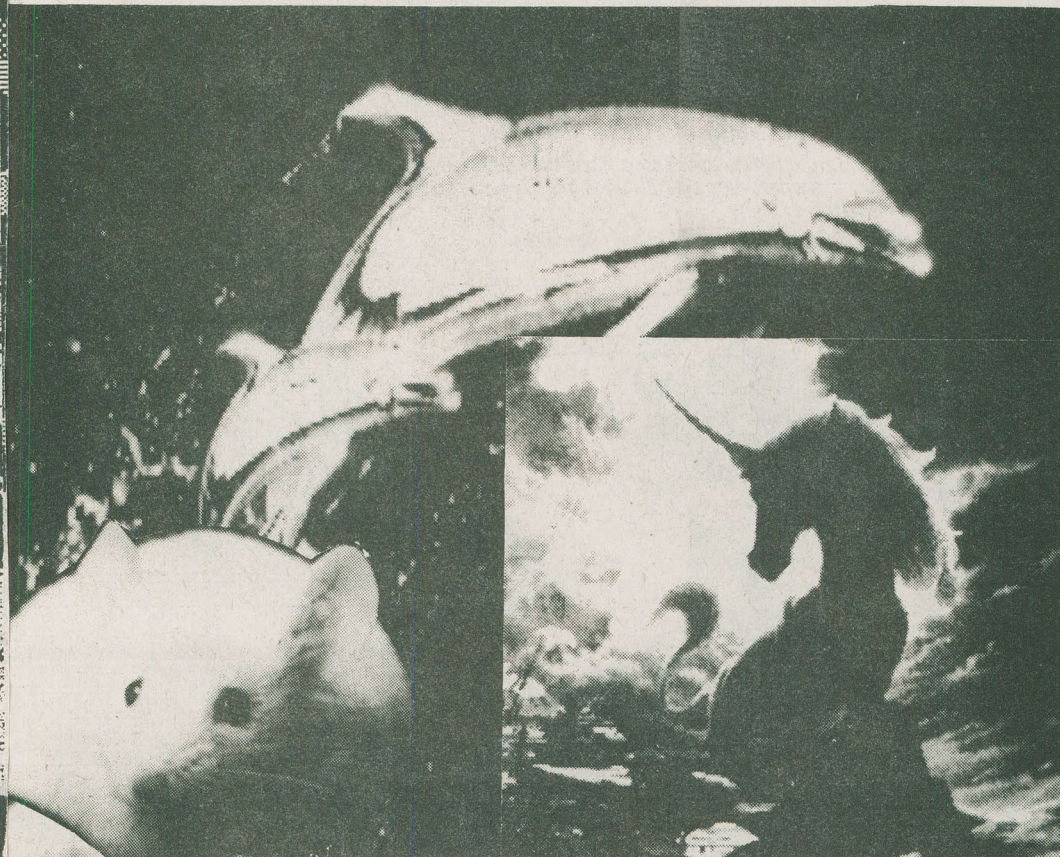




# R CLIPART

convert them to PC Paintbrush format, you can pour them into Ventura chapters and use them as desktop publishing clip art... admittedly, in less than exciting black and white unless you have a colour output device. We've included a program which will convert most of them to either PCX or RIX colour format. However, we strongly urge you to buy a copy of TGL Plus, a commercial file conversion package which will allow you to manipulate them in much more useful ways, and get them into virtually any file format you like. See the December 1988 edition of Computing Now for more information about TGL Plus.

Because of the size of these files, we're distributing them on a single quad density disk. You will need a 1.2 megabyte AT drive to read it. If you can't get this together, you can order this collection on four normal PC type disks for a slightly higher cost. (Sorry about the up charge... it's for the duplication time.)



## EYE

Close up of an eye.

## FISH

Just before the cat got 'em

## JILL

Jack's sister.

## LEGEND

A fantasy scene

## MICKEY

Fifty year old mouse

## PANDA

Art deco bear

## SANCT

Ocean and no dead birds yet.

## TAROT

Two cards

## TENSPEED

A bicycle

## WAVES

The ocean revisited

## GODDESS

Home perm aftermath.

## LOVERS

Two people and a fireplace

**QUAD DISK \$19.95**  
**FOUR 360K DISKS \$31.95**

## A F G I F 4

### APPLES

Two apples... the eating kind, not the litigating kind.

## BIRDEYES

Abstract bird.

## CABLE

The second most breathtaking nude GIF file we've encountered of late.

## CATFRAME

A cat.

## DANCERS

A Victorian print of some dancers.

## FIRE

The first most breathtaking nude GIF file we've encountered of late.

## FROGG

A really weird looking frog.

## GOYA

A classical nude GIF file.

## LADYHAT

A lady in a hat.

## PAULINAO

A remarkable GIF file. A girl with her clothes on.

## ROCKER

An abstract of a rocker. Might be Dylan, might not...

## ROOTSV

Pythonesque trees.

## ROPE

Some ropes on a ship.

## ROSE

A close up of a flower.

## SKYLINE

A still life.

## SUNSET

Another still life.

## SWORD

Warrior maiden in repose.

**QUAD DISK \$19.95**

**FOUR 360K DISKS \$31.95**

## A F G I F 5

This collection comes on two quad density floppies, so it costs a few bucks more. Because a number of the files in this collection are larger than a normal three hundred and sixty kilobyte floppy disk, we are not making it available on dual density diskettes. Please note that while this collection does include a simple multimode file viewer, the conversion utilities included with our previous GIF collections have been omitted in the interest of giving you more pictures.

## LILIES

impressively detailed scan of tiger lilies.

## MBBUDGIR

is three women on the deck of a boat lying on... and partially floating into... a Budweiser ad. Quite a strange image.

## CRAYBALL

is a stunning ray traced picture of some mirrored balls.

## WETSHIRT

is a breathtaking picture of a girl in a T Shirt. It's the biggest GIF file we've ever encountered.

## LOVERS

is a fantasy picture of two lovers... one human and one probably not.

## STRIPE

is a lady in striped pants... and not a lot else.

## AMDEK

beautifully executed scan of a watercolour.

## COLOURS

is edible, or very nearly so. It's a picture of desert.

## CHERIE

is a woman in furs. Sets you up nicely for thoughts of winter.

## CABLE3

is a girl named Cable relaxing.

## PBEAR

is a mother polar bear and her cub.

## CABLE4

in which Cable works out.

## KIWI

is a snack tray... kiwi fruit, berries and enough carbos to set your monitor up for Weight Watchers.

**\$24.95**



## AFCLIP1

BABY, BELVEDERE,  
BLUES BROTHERS, BLUENUN,  
BUGS, CHEETAH, CLIPART,  
FISHES, GIRLWING, KNOT,  
KOALA, LETTER A,  
HEARTS, WOMAN,  
RELATIVITY, SCAN,  
ESCHER WATERFALL

## AFCLIP2

AIRCRAFT, BUTTERFLY,  
CAR LOGOS, MORE CLIPART,  
COLLECTORS CARS, CUBE,  
DANCERS, DRAGON, GLASSES,  
GREYHOUND, HANDS,  
MORE KNOTS, SKELETON,  
LEATHER GODDESS,  
MINOTAUR, TIGER,  
ANOTHER WORLD,  
ZEBRA GIRL

## AFCLIP3

BADNEWS, DRAGONS,  
DREAM, KIDS1,  
MEN1, WOMEN1,  
MONALISA, CAT,  
RHINO, TRIANGLE,  
OLDMAN, SHELL,  
BEACH, FLOWER,  
PAISLEY

## AFCLIP4

BUDBRAIN, DRAGON2,  
SKULLS, KIDS2,  
MEN2, WOMEN2,  
PERSUIT, SUNDIAL,  
PORCHE, EASTWOOD,  
VANGOGH, IBMWARS,  
STELLA, QUADRANT,  
YAWN

## AFCLIP5

BIRD, BOOP, BORDER,  
CLIPART1, CLIPART2,  
CONAN6, COUPLES4,  
DRAGONX, ELEGANT,  
HUNTED, KIDS3,  
KRAZYCAT, MEN3,  
SCRAPS, SCROOGE,  
SPLINTR, WOMEN3

## AFCLIP6

AUSTRAL, CLIPART3,  
CLIPART4, CONAN1,  
CORNCOCK, DONATELL,  
IBMGIRL, KIDS4,  
MEN4, NEWMACS,  
PANEL, PINUP,  
POOH, SPORTS, WOMEN4

# ALMOST FR

## FOR PC/XT/AT

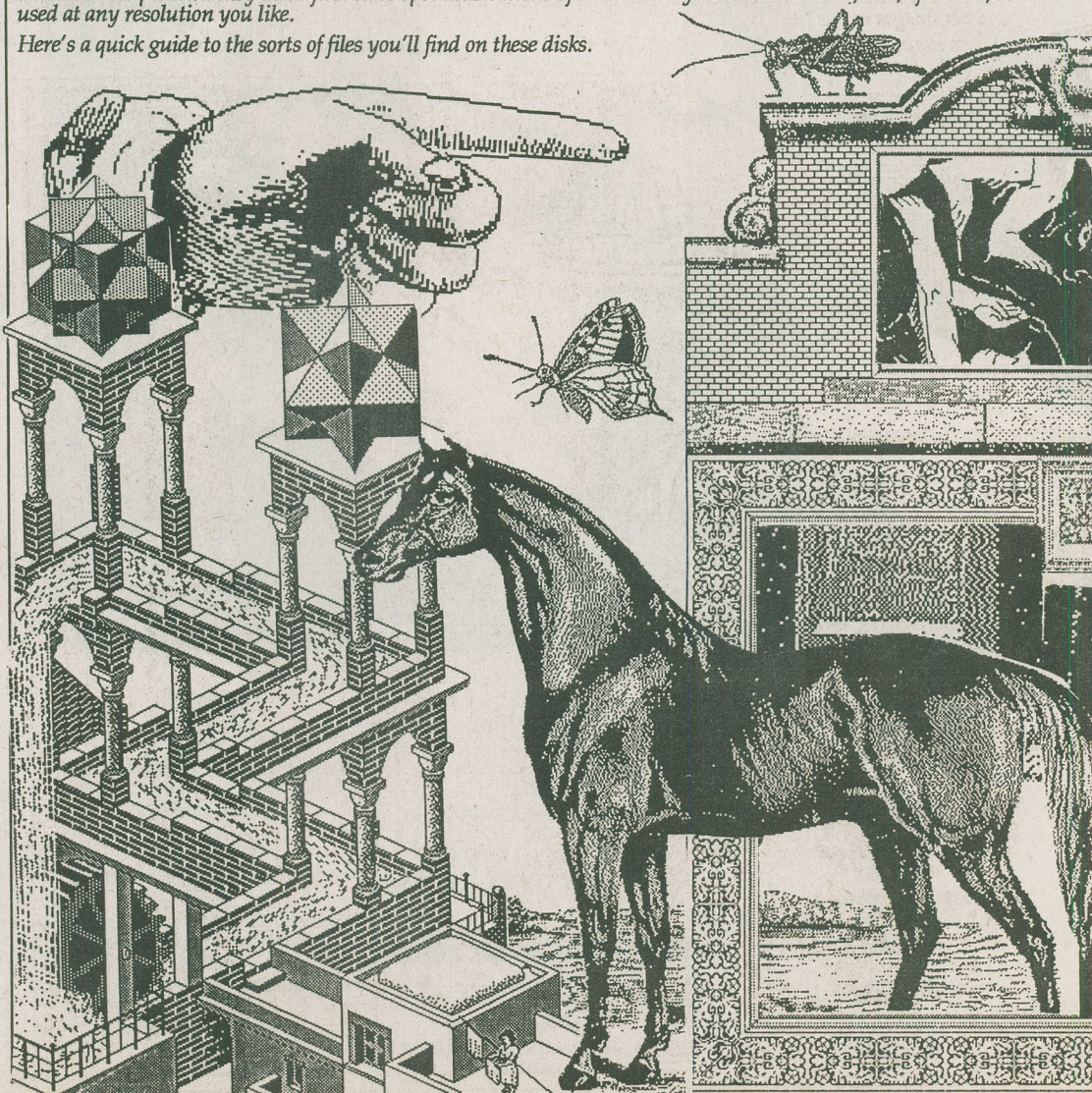
Electronic clip art can turn a dull desktop publishing document into something visually exciting. Edited with a paint program, clip art files can personalize your reports, documents and newsletters.

Having a library of clip art on tap is tricky unless you have a scanner and a suitable source of paper clip art to start with. Almost Free Clip Art solves all this. Each one of our disks contains about three hundred and fifty kilobytes of clip art – at least a dozen images per disk. These collections have been carefully chosen to each contain a variety of interesting pictures suitable for a wide range of applications.

These pictures are suitable for use with virtually all applications which accept bitmapped art. This includes Ventura Publisher, Aldus PageMaker, Word Perfect 5 and PC Paintbrush on the PC, and PageMaker, Ready Set Go and Quark on the Macintosh. The files are all provided in MacPaint format. The PC versions come with a utility to convert them to GEM/IMG, PC Paintbrush PCX and TIFF files.

All of these pictures are in the public domain. You can use them without any copyright restrictions. At three hundred dots per inch they make first class spot illustrations of about two by three inches. They can, of course, be used at any resolution you like.

Here's a quick guide to the sorts of files you'll find on these disks.

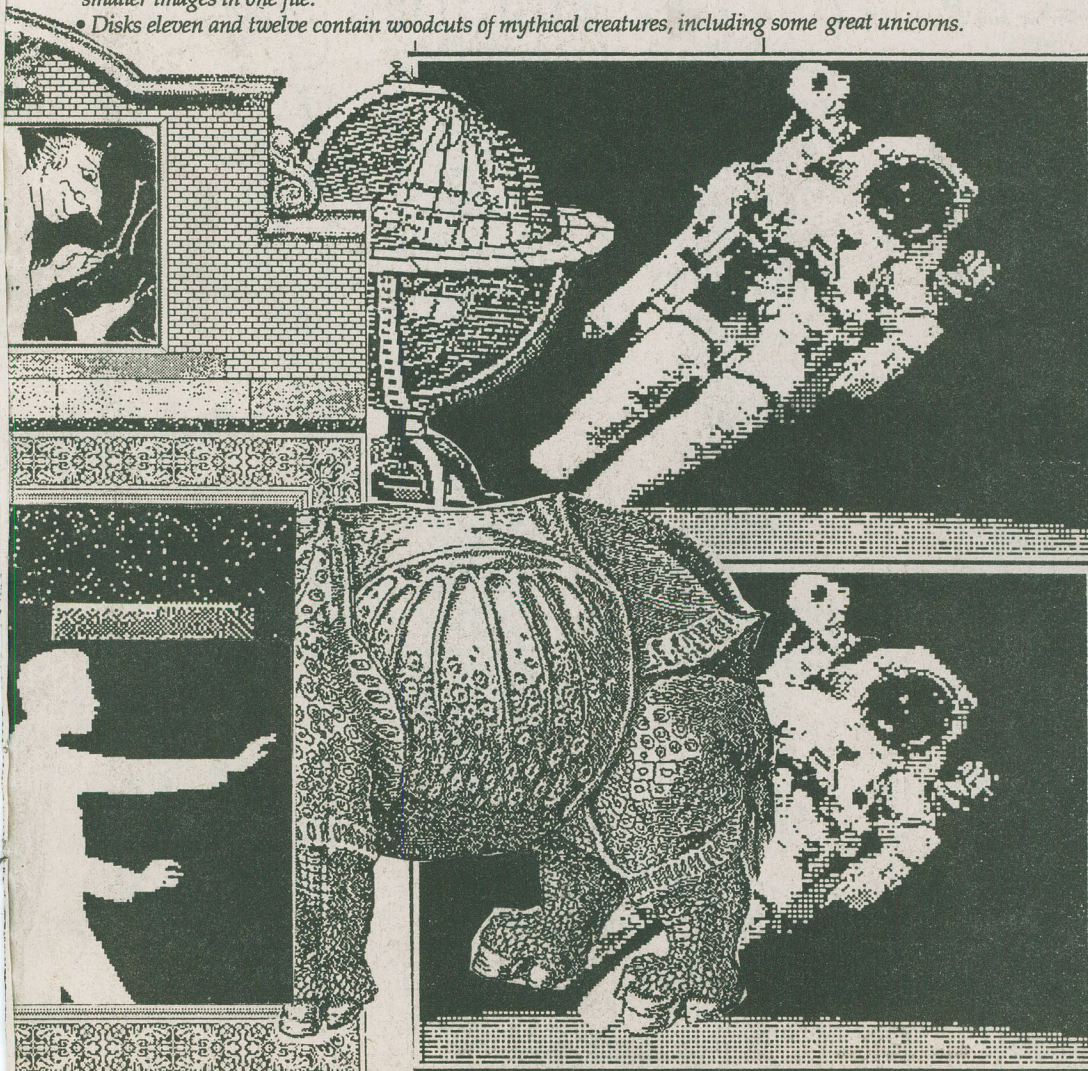




# FREE CLIPART

## AND MACINTOSH

- The large majority of these pictures are simply full page pictures. They range from Victorian line art, wood cuts and electroplates and etchings right up to contemporary graphics.
- A number of the disks contain cartoon characters.
- Most of the disks have at least one nude on them.
- Disks three through six include files of silhouetted men, women and children.
- Many of the disks include elaborate frames and borders.
- The disks from volume nine on contain files called MENHEAD and FEMHEAD. These are male and female heads drawn as contemporary clip art.
- Disk twelve is a bit unusual. It contains a number of "construction set" pictures, as well as conventional clip art. These include several animation studies and a file of architectural sections to allow you to "assemble" a dungeon.
- Some of the disks have files called CLIPART, which probably seems a bit redundant. These are collections of smaller images in one file.
- Disks eleven and twelve contain woodcuts of mythical creatures, including some great unicorns.



### AFCLIP7

ANBORD2, BIGBEN, BORDER4,  
CIVWAR, DRUIDESS, FISH,  
GARDENWA, GIRL12,  
INSECTS, LIONCUB,  
MINTPLAN, NATURE,  
PIE, RUINS, WEAVING,  
WMAF, MISCI

### AFCLIP8

ANTBORD, BERRIES, BORDER1,  
CUTOUT2, DOG, EAGLEBOR,  
FLWALL, HORSE, INDIAN,  
JACKIESC, JAGUAR, KNIGHT,  
MACRAT, OWL1,  
PITCHER, PIZZA,  
STUFF2, HKGIRL

### AFCLIP9

BAND1, BUGSBNY2, CAROL2,  
CLIPITS1, DRAGPRIN,  
FEMHEAD1, FEMHEAD2,  
FLEURLIS, HANDS3, JAPANES,  
LOVELIPS, SAILRMAN,  
MENHEAD1, MENHEAD2,  
PEACOCK, SKULLROS, SPACE2,  
TILES, WEREWOLF

### AFCLIP10

BAND4, BUGSBNY, CLIPITS2,  
DAFFYDCK, DISCUS, DRAGNLDY,  
EARTH, FEMHEAD3, FEMHEAD4,  
ELMRFUDD, GEOMETRC,  
HANDS6, HANDS7, MANHAT,  
MENHEAD3, MENHEAD4,  
NOUVEAU, TWERPISA, SPACE1,  
TIGER, WALLBORD

### AFCLIP11

ARABIAN, DISCUS,  
MYTHICAL MONSTERS 1,  
MYTHICAL MONSTERS 2,  
KELLY, PARTY GOERS,  
ESCHER, SPIRAL BASKET,  
DROWNED CATHEDRAL,  
GIRDERS, BLACK FREIGHTER,  
BEAMS, WOVEN DEMONS,  
POOLSIDE NUDE,  
SUNTANNED NUDE

### AFCLIP12

ANIMALS, BCKGRND1,  
BCKGRND2, BUGS, DUNGEON,  
MYTHICAL MONSTERS 3,  
MYTHICAL MONSTERS 4,  
MYTHICAL MONSTERS 5,  
FEMHEAD5, FEMWALK,  
HYDRA, KIDS, MALEWALK,  
MENHEAD5, PEOPLE,  
SQUIRREL, TILED FRAME



# SOFTWARE FOR THE PC

## DESKTOP PUBLISHING

# CLIPART

## FOR TEACHERS

We've had numerous requests from people working in the educational fields for desktop publishing clip art collections designed especially for use in schools. Here it is. These disks have been carefully assembled for use by teachers to dress up desktop published documents.

These disks are designed to be easy to use with most of the popular desktop publishing packages. They support Ventura Publisher, Aldus PageMaker, WordPerfect 5 and a variety of other applications. If your desktop publishing system or word processor will accept GEM/IMG, PCX, MacPaint or TIFF files, you can use our clip art collections. We include a powerful utility program with each disk which will allow you to convert our image files into any of these popular formats. You can also view them on your screen prior to using them. Pages with pictures on them get noticed! With these clip art collections, it's extremely easy

to "pour" graphics into your desktop published documents, and you'll always have a wide variety of them on hand. Our Almost Free Clip Art disks are far less expensive than most other clip art services, and they come with our usual promise of your satisfaction. If you have any difficulties with your disk, simply call us and we'll walk you through them. If you don't feel the disk is worth what it cost once you've had the opportunity to try it, simply return it to use for a complete refund with no questions asked.

These disks are available for both the PC and the Apple Macintosh. In the former case, they come on either 5 1/4 inch floppies or 3 1/2 inch microfloppies. The PC images are formatted as Ventura GEM/IMG files, with the utility included to convert them into the other formats listed above. The Macintosh images are formatted as MacPaint files.

### EDUCLIP1

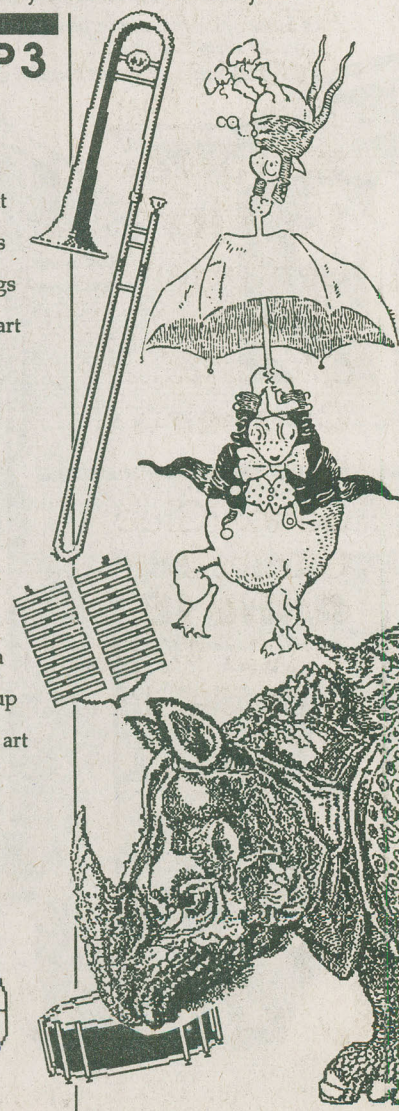
**BAND1**  
Assorted band instruments  
**BUGS**  
A wabbit  
**CAMEL**  
A cartoon dromedary  
**CUBE**  
Optical illusion  
**DISCUS**  
Greek statuery  
**EARTH**  
Viewed from space  
**FEMHEAD4**  
Commercial style art  
**FLEURLI**  
French border  
**GARDENWA**  
A garden path  
**HANDS**  
Two hands writing  
**HANDS6**  
Pointing fingers  
**HOMES**  
Assorted dwellings  
**HORSE**  
Animated equine  
**KNOT**  
A convolution  
**KOALA**  
Small Australian bear  
**LETTERA**  
Variations on the letter A  
**MACIMG**  
Hearts  
**MENHEAD4**  
Commercial style art  
**MINTPLAN**  
Some leaves  
**MUSIC**  
A staff  
**PAISLEY**  
A scotch print  
**POOH**  
Famous bear  
**TIGER**  
Big pussy cat  
**WIDEARAB**  
Ornate border  
**\$19.95**

### EDUCLIP2

**ANBORD2**  
Old style border  
**BIGBEN**  
Famous time piece  
**BUILDING**  
Constructions  
**CIVWAR**  
Confederate soldier  
**CLIPART4**  
Assorted images  
**CLIPITS2**  
Little bits of graphics  
**FEMHEAD1**  
Commercial style art  
**FEMHEAD3**  
More of the same  
**FISHES**  
Various aquatic dwellers  
**GLASSES**  
Victorian specs  
**HANDS4**  
Hands at work  
**HANDS8**  
More hands  
**KNIGHT**  
Medieval policeman  
**KNOT2**  
Three convolutions  
**MENHEAD2**  
Commercial style art  
**MENHEAD6**  
And again  
**RHINO**  
Ornate rhinoceros  
**TOOLS**  
Various objects  
**WMAP**  
World map  
**\$19.95**

### EDUCLIP3

**AIRCRAFT**  
Things that fly  
**BORDER**  
A frame  
**BUGS2**  
Return of wabbit  
**CLIPART1**  
Various graphics  
**CLIPITS3**  
Lots of little things  
**FEMHEAD2**  
Commercial clip art  
**FEMHEAD6**  
And again  
**FEMHEADA**  
And still again  
**FEMHEADB**  
Once more  
**FISH**  
Fancy goldfish  
**HAM**  
Food  
**HANDS3**  
Hands at work  
**HANDS7**  
More of them  
**JAGUAR**  
Immense kitten  
**MACRAT**  
Rodential close up  
**MENHEAD3**  
Commercial style art  
**MENHEAD5**  
And again  
**PEACOCK**  
Lovely bird  
**TILES**  
Fancy border  
**\$19.95**





# ALMOST FREE LASERJET FONTS

There hasn't been a Ventura user yet born who hasn't cried out for more fonts at one time or another. This collection should shut up even the most obstreperous of them. Consisting of over three megabytes of Laserjet compatible soft fonts, this disk features both body and display faces which range from the reserved to the seriously deranged. There are big fonts, small fonts, listing fonts, bloody fonts, fonts with shadows, fonts with stripes, reversed fonts, twisted fonts and fonts which bark when you throw them a bone. If the font you want isn't here it hasn't been beamed down yet.

These collections also include a Ventura width table all ready to merge in and go, along with a complementary copy of our VFM package, the Ventura Font Machine, to make managing all your soft fonts dead easy. These fonts will also work with other applications which use Laserjet compatible soft fonts. They are not suitable for use with Deskjet printers. The fonts are provided in the faces and point sizes shown here.

These collections come on a quad density disk... compressed, of course, for only \$19.95 each.. They are also available on multiple lower density disks for \$31.95.

## LASERJET FONTS 1

Abhode 18 Point

Amityville 18 Point

Avantis 18 Point

Basque 18 Point

**Begotten 18 Point**

**Big City 18 Point**

Centurion Medium 18 Point

Channel 18 Point

*Channel 24 Point Oblique*

**Copper 18 Point**

Courier 18 Point

GalaxyGlue 18 Point

Garnet 18 Point

**Gillie 18 Point**

Olivia 18 Point Ornation

Optimial 18 Point Palatinus

ll • φ Γ η ∞ ⊥ η θ ∈ ∫ (symbol)

Prestigus Hoboken

Sebastian Rocky Olde English

**Cartoon** *Script*  
Channel 12 Point

\$19.95

## LASERJET FONTS 2

**Buck 24**

**Bongo 24 Bongo 36**

Chancellor Italic 10 12 14

Chancellor Bold 18 24

*Chancellor Bold Bloody Italic*

**Chancellor Bold 30 40**

**Chancellor 50**

Cellestial 18 Cellestial Bold 12

Cellestial Italic 10 Cellestial 8 10 12

**Avant Reversed 22 Opus 28**

Handwriting 16 tempuz 12

**Windsor 24**

Bold 10

Prolog Italic 10 Prolog 10 Prolog 7

**Deco Plus 12 Deco Plus 14**

**IMPRESSED 12**

→ I n \* ⇨ → □ i I □ \* ⚡

Times Mutant Italic 12 Bold Italic 12

**Times Repressed Bold 18**

RUNIC 12 Coronet 18

**Gaspipie 36 Roadblock**  
**WOOD FENCE**

\$19.95 (ONE QUAD DENSITY DISK)  
\$31.95 (MULTIPLE DUAL DENSITY DISKS)



# PC PAINTBRUSH COMPATIBLE COLOUR CLIPART

If you like the idea of full colour images to play with but you don't really have the hardware to make our GIF collections worth while, you might want to check out this assortment of picture files. We've selected some of the best sixteen colour images from our voluminous colour clip art collection, converted them to the PC Paintbrush format and assembled them into this assortment.

These pictures are compatible with Ventura publisher, and when you get finished looking at them you can pour them into desktop publishing chapters if you want to. Once again, we strongly recommend that you buy a copy of TGL Plus, as described above, which will allow you to convert these pictures into almost any graphics file format you need.

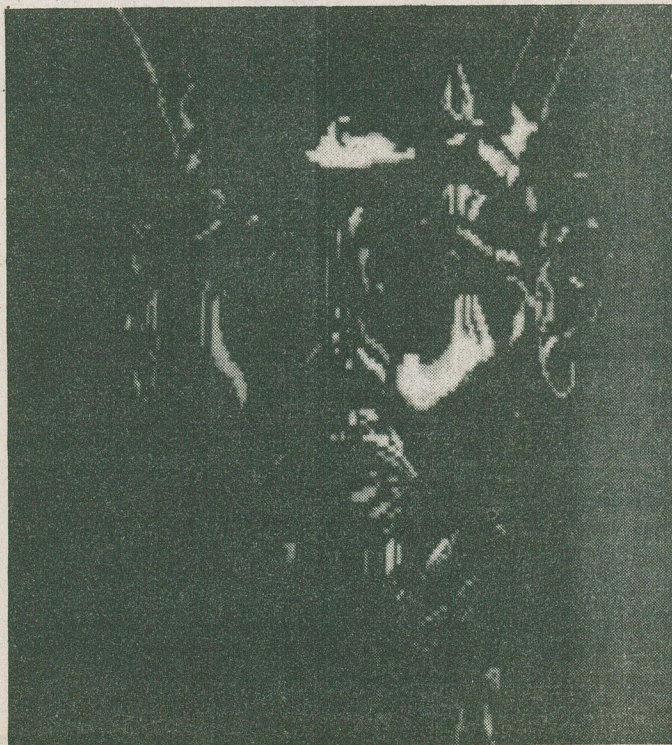
These files are kind of big... this collection requires two regular 360K floppies to hold it. Also note that some versions of PC Paintbrush do odd things to palettes... some of the colours may require fine tuning for your system. The two disk set is \$25.95.

## PC PAINTBRUSH® 1

**PUMA**  
A mountain lion in the wild.  
**ASIA**  
A lady from the far east.  
**BABOON**  
A colourful mandril.  
**BLADERUN**  
From the film.  
**BODE1**  
Vaughn Bode's smiling wench.  
**DESTRO**  
The star destroyer.  
**DRGN**  
A pretty fierce looking dragon.

**ESCHER**  
Reflection in a mirrored ball.  
**FRUIT**  
A still life in phosphor.  
**KINGTUT**  
Boy king's death mask.  
**OPTIC1**  
Just an illusion.  
**TALLSHIP**  
A splendid clipper ship.  
**WINEGLAS**  
Three champagne flutes.  
**WIZZARD**  
From the film.

**\$25.95 (TWO DISK SET)**



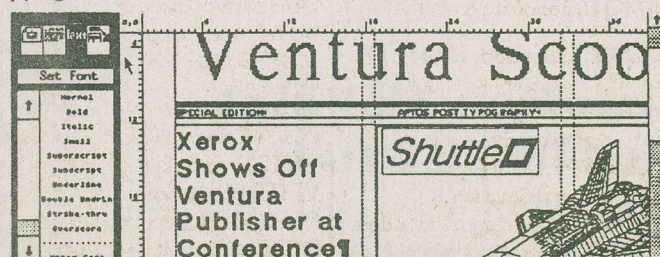
# VENTURA SURVIVAL DISK

If you use the popular Ventura desktop publishing package, you'll probably be aware of a few of its... ahem... deficiencies. For example, you may have encountered the monumental difficulties involved in using it with additional soft fonts. Perhaps you've tried to pour image files into your documents and found them a bit awkward. What about the unspeakable boredom of having to use the same type faces over and over again... it's driven lesser mortals back to their typewriters.

As long time Ventura users ourselves, we've developed and collected quite an assortment of Ventura support programs. These things perform all sorts of useful functions, mostly connected with making Ventura a better place to live. Much of the software in this collection is specifically intended to make Ventura co-exist peacefully with a Laserjet compatible printer.

This is the first time we've offered all these handy programs in one comprehensive collection... and the first time some of them have been seen at all. These are the latest versions of all of these utilities.

If you publish with Ventura, you can't afford to be without this collection of programs.



## VENTURA VOLUME 1

**FONTILT** is a splendid program for making boring fonts into exciting ones. It inhales any standard Laserjet soft font and outputs a font with your choice of special effects added to it, including drop shadows, bounding boxes and even dripping blood.

**VFM** manages your Ventura soft fonts. It quickly makes width tables without any batch files to contend with, allowing you to add fonts to Ventura painlessly. This is a must for any Ventura user.

**GEMSCOOP** lets you view and optionally print out any GEM/IMG image file... without having to load up Ventura. Supports CGA, Herc and EGA/VGA monitors as well as LaserJet, PostScript and FX-80 printers.

**PCXSCOOP** is a version of GEMSCOOP for PC Paintbrush images.

**MACSCOOP** is a version of GEMSCOOP for MacPaint images.

**HP-SLASH** will reduce the often times voluminous sizes of soft font files by allowing you to selectively "prune" out unused characters and symbols. Saves on hard drive space and really speeds up font downloading.

**MAC2PCX** converts popular MacPaint files into PC Paintbrush PCX

files, giving you access to a whole plethora of instant clip art. If you have PC Paintbrush, this will make it easy for you to edit and modify MacPaint image files.

**MAC2IMG** converts MacPaint files directly into the GEM/IMG paint form used by Ventura. Saves on conversion time, disk overhead and gets around one of Ventura's long standing bugs.

**TCAP** is a memory resident program which captures text screens as GEM/IMG graphics suitable for pouring into Ventura documents as pictures. These screens preserve the original screen attributes and can be scaled to any size from within Ventura.

**GCAP** captures monochrome graphics screens into GEM/IMG files, suitable for pouring into Ventura chapters. A Windows compatible version is also included.

**FSEE** is a quick 'n nasty program to let you view the contents of a soft font file on your screen before you print it. It lets you see what new fonts will look like without your having to download them and print them out.

**VPScreen** is a Ventura screen font editor. It allows you to change the way fonts look on your screen.

**\$19.95**



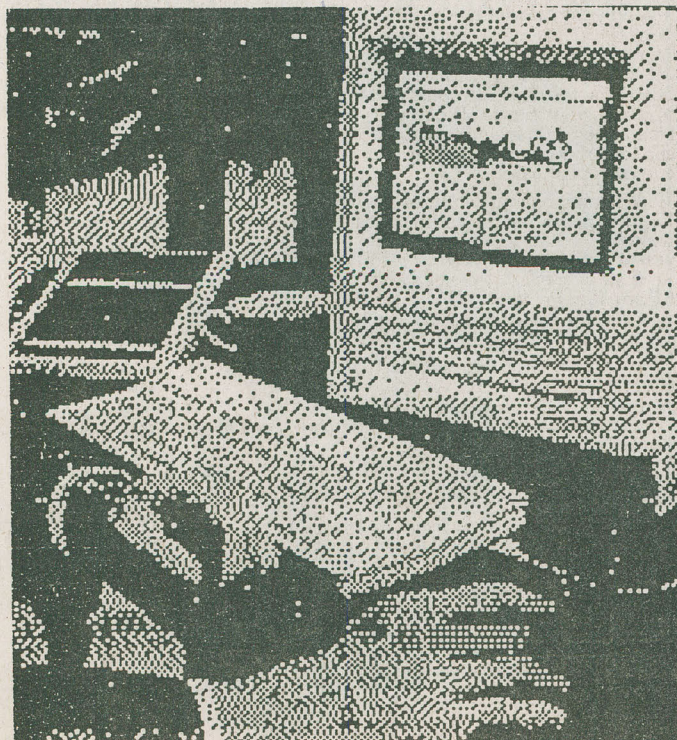
# HARD DRIVE SURVIVAL KIT

If you have a hard drive you can have all sorts of powerful utilities and programs installed in your system to make your use of it more efficient and productive. We've collected the best of these utilities on a single disk to help new PC users get the most from their hard drive systems. Please note that these programs are included in our other almost free software disks. Descriptions of them are provided elsewhere in this catalog.

**HGCC** Colour card emulator for Hercules  
**ADDRESS** Resident envelope addresser  
**WHEREIS** Hard drive file finder  
**SIZE** File size finder  
**SETUP** Resident Epson printer setup  
**RENDIR** Sub-directory renamer  
**POPCAL** Resident perpetual calendar  
**CLOCK** Screen clock  
**EDWIN** WordStar like editor  
**NANSI** Screen driver  
**CACHE** Disk cache  
**RAMDISK** RAM disk program  
**LPTX** Printer redirection  
**MURPHY** Foolishness and wisdom  
**LOCKERUP** Security system

**BOTH** Printer paper saver  
**PCWINDOW** Resident grab bag  
**PINPRESS** Prints things very small  
**NOTEPAD** Resident notepad  
**FREE** Free space finder  
**HOTDOS** Multiple tasker  
**BLANK** Screen blanker  
**K9** Another resident grab bag  
**LAZY** Menu generator  
**UNWS** WordStar converter  
**MORTGAGE** Measure of your indenture  
**LOOK** File viewer  
**PCBW** Colour killer  
**VTREE** Hard disk map  
**VILER** File manager  
**POPCALC** Resident calculator  
**DOSEDIT** Command line editor

\$19.95



# ALMOST FREE MICROSOFT WINDOWS TOOLBOX

Windows is one of the few truly universal user interfaces. It's equally approachable by new users and experienced professionals, and it makes any application written for it a nicer place to be.

In this collection we've assembled an assortment of public domain Windows applications. Some are just unique little gadgets, others powerful programs to make your Windows environment more productive. All of them, though, represent the power and functionality of Windows. If you use Windows, there'll be at least one of these things that you won't want to be without.

Every program on this disk has been extensively checked to make sure that it functions as it should and that it contains no viruses or other nasties. Most sources of public domain software do not provide you with this assurance. This disk carries the same promise that all our Almost Free Software does. If you don't feel that it's fair value once you've checked it out, we'll buy it back from you with no gripes or questions. If you have problems with it, our help desk is as near as your phone... just call (416) 445-5600.

If you're not already receiving it, please call us and ask to be put on the mailing list of Personal Software News, our newsletter. It's free.

This collection is only available on quad density disks. Please note that this disk requires Microsoft Windows to run. Windows itself is not included.

## VOLUME 1

**FIREWORKS** is a screen blanker which will save your monitor by fading to black after a preset time of inactivity. While it's sleeping, it displays random pyrotechnics.

**GLOBE** shows you the world... rotating, at various magnifications and going in any direction you please. It's cheaper than an airplane ticket and not as likely to get delayed. This is a French version... it's the best globe we've found.

**FISHES** is a aquarium in a window. Everyone ought to have one of these.

**FREEMEM** puts up a window which tells you how much free memory you have available.

**DIGCLOCK** puts up a tiny window which tells you the time. This is not as sophisticated as the analog clock window, but it takes up a whole lot less space.

**SNAP** copies parts of your screen to the clip board.

**HEXCALC** is a hexadecimal calculator.

**FUSE** is just an attractive window to fill an otherwise unused corner of your screen.

**COMMAND POST** adds features to Windows, making it a lot easier to use and get around in.

**CMDTREE** runs with command

post to make changing directories dead easy.

**TETRIS** is the classic Soviet falling block puzzle done for Windows.

**PUZZLE** is a puzzle game with a twist. Assemble the scrambled faces. Comes with an assortment of faces to choose from.

**BOUNCE** is a really slick bouncing planet window. While perhaps not all that useful, it's a hoot to watch.

**CREDIT** is a Windows credit card manager. If you live by plastic, this program will keep you from dying by it too.

**DESKTOP** is another Windows command shell, this one with a configurable user interface. It was a hard choice between this program and Command Post, so we've included them both.

**GCP** is a graphics tool for Windows. It allows you to look at and manipulate most of the popular paint file formats, including GIF and PCX. Has astounding dithering facilities. UNICOM is a nicely executed telecommunications program for Windows, complete with all the trimmings.

**HPCALC** is a Hewlett-Packard style programmable scientific calculator in a window.

**TIFFANY** will copy the contents of any window to a TIFF file.

**FINDER** will locate files across any combination of drives you specify.

\$19.95 (QUAD DISK)



# ALMOST FREE AUTOCAD

**SPEED UP DRAWING AND EDITING IN RELEASE 9  
MINIMIZE TYPING AND CORRECTING!**

Welcome to our first volume in our new AutoCAD series. To enjoy this exciting software collection you'll need a copy of AutoCAD Release 9 (the menus work with Release 10, but do not include Release 10 commands — versions prior to Release 9 do not support pulldown menus), a mouse or digitizer tablet (a digitizer is required for the tablet menus) and any version of DOS.

As with all our Almost Free Software collections, this one carries our promise of satisfaction. If, after checking it out, you aren't completely happy with it, we'll buy it back from you with no questions or hassles.

## VOLUME 1 RELEASE 9 VERSION

**A CUSTOM PULL-DOWN MENU** with over 150 of the most often used commands, values and related variables grouped in logical order — almost eliminates searches and menu trees. Includes custom macros that call up a series of commands with a single pick.

**CUSTOM ICON MENUS** let you see your symbol library drawings or hatch patterns before you choose.

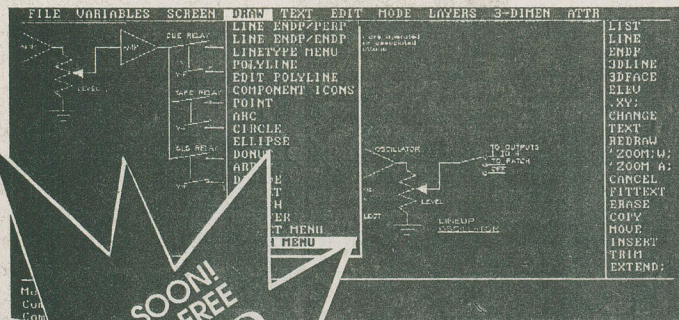
**A CUSTOM SCREEN MENU** for rapid picking of favorite commands or macros.

**A CUSTOM 175-COMMAND TABLET MENU** for rapid picking of commands and macros (requires digitizing tablet), plus a blank DWG and menu file for making your own.

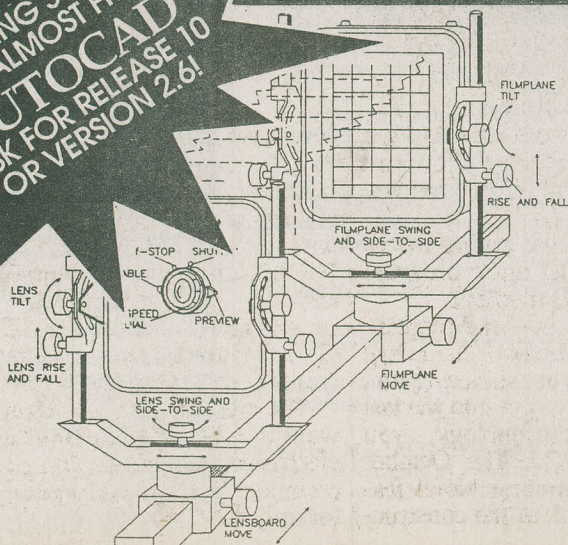
**A LIBRARY OF COMMON ANALOG AND DIGITAL ELECTRONIC SCHEMATIC SYMBOLS**, complete with icon menus for no-typing selection.

**PLUS:** All the menus are ASCII files and can be easily changed with your word processor. Edit the commands just the way you want them, for your style of drawing.

**PLUS:** complete documentation files with explanations of all the menu structures and macros and how you can change them.



COMING SOON!  
THE ALMOST FREE  
AUTOCAD  
DISK FOR RELEASE 10  
OR VERSION 2.6!



# ELECTRONICS & TECHNOLOGY SOFTWARE SERIES

This is the first in a series of software collections assembled specifically for people working with electronics and related fields. In it, we have tried to include programs for a variety of interests. The Perfect speaker enclosure design program will appeal to audio enthusiasts... it gives you access to the same sort of calculation facilities that professional speaker engineers use. There are several programs which will be of help to amateur radio operators. Finally, things like BDS will find use in just about any electronic application.

As with all our Almost Free Software collections, this one carries our promise of satisfaction. If, after checking it out, you aren't completely happy with it, we'll buy it back from you with no questions or hassles.

In addition, unlike other sources of public domain code, we've scrutinized all of these programs carefully for viruses and other nasties. None of this code will leave your hard drive a smoking ruin.

## VOLUME 1

**PERFECT** is a powerful system to design speaker enclosures. It allows for a wide variety of general box designs and speaker sizes and impedances. All you do is to plug in the appropriate numbers and it will spit out both the dimensions of the box and tell you how it will perform. Saves hours of work and calculations and a lot of wasted wood.

**BDS** is a pop up utility especially designed for electronics. It performs a number of common calculations, including inductance, capacitance, wavelength and so on. It's better than having a paid lacky with a calculator because you don't have to feed pop up utilities.

**DIPOLE** is a simple program to handle the calculations for dipole

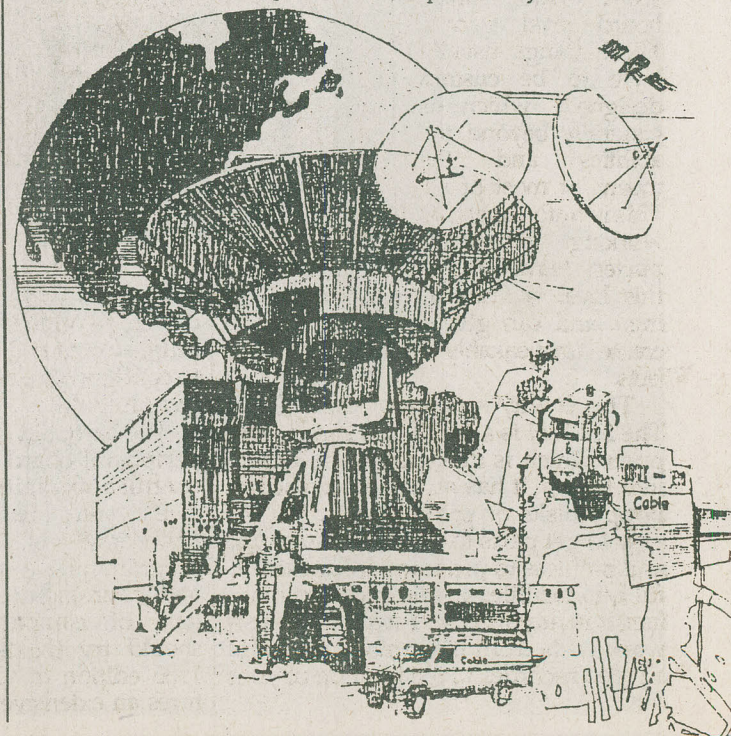
antennas. It's written in BASIC so you can even take it apart and see what it's up to.

**GEOS** is a great program for finding the location of geo-stationary satellites. It provides everything you need to align a satellite antenna from anywhere in Canada... all without recourse to charts, books, prayer or higher mathematics.

**PARABOLA** is a BASIC program to help design parabolic antennas. It lets you calculate all the grotty details for anything from a Ku band dinner plate to your own DEW line backscatter radar system.

**VSWRCALC** calculates voltage standing wave ratios for any wavelength.

**YAGI-UDA** is a really complex program for an even more complex problem... designing Yagi antennas. Plug in some numbers and it will spit out a sky hook.





# SLOTH

## THE COMPUTER THAT CAN'T DO ANYTHING

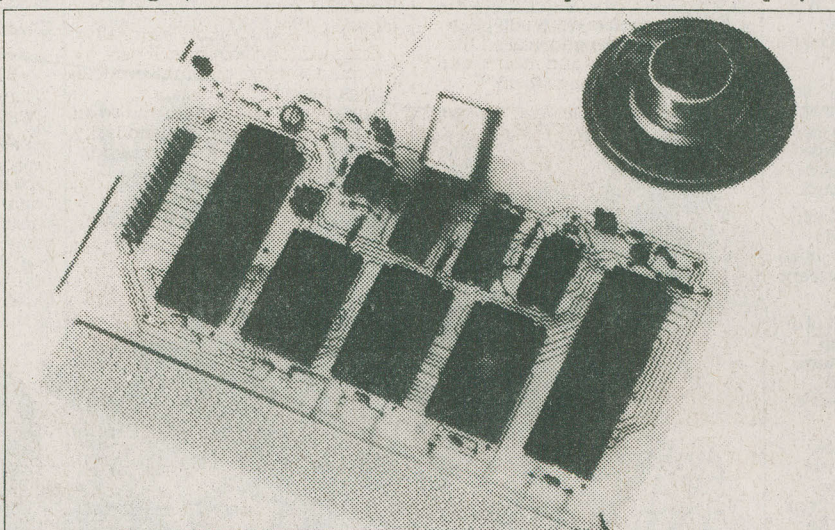
Computers can do a lot more than just manage data bases and play video games. Specialized microprocessor boards can be used as programmable frequency counters, intelligent temperature controllers, timers, monitors... dedicated microcomputers are at the heart of most of the sophisticated high tech toys that make our lives exciting and our bank balances so easily managed with just a few fingers.

Unfortunately, most individual humans don't get to work with small, board level micros. These things usually have to be custom designed, which is generally beyond the abilities and the means of most of us. This is unfortunate, as working with computer hardware at this level is fascinating... and can give one the power to create unspeakably sophisticated projects.

This is why we created the SLOTH. The SLOTH is a small Z80 based computer which is designed to be turned into things. It has no screen, keyboard, floppy disks or printer port... but it's easy to get parts for, quick to assemble and painless to program. It has powerful I/O facilities to allow you to interface it to anything you want to make it work with, from the remote control of a video recorder to the ignition of your car.

The SLOTH isn't a trainer... it's designed to be built up into working projects. It's programmed with inexpensive 2716 EPROMs. It has twenty-four lines of I/O and three programmable counter timers to talk to the rest of the world with. Included on the main SLOTH board are a speaker

tion of the SLOTH board and a sample program for it. Other issues carry some basic SLOTH applications... timers, controllers and other things that can be made with the SLOTH. However, the low cost and flexibility of the SLOTH will unquestionably give you countless ideas for projects of your own.



The SLOTH package available from us includes a bare SLOTH board... both the main processor board and the LED display board... a parts list, a complete schematic and parts overlay, a source listing for an exercise program and a set of article reprints to explain the system in painstaking detail. In addition to this you'll need the parts to stuff the board... which are widely available... and a

driver, two kilobytes of static RAM, a pulse source and jumpers to allow you to configure the system to do what you want it to do.

The basic SLOTH also comes with a peripheral board to let one's program control a six digit LED display.

If you have a rudimentary knowledge of assembly language programming, a working soldering iron and a burning desire to get into the fast lane of computer technology, you should try the SLOTH. The October 1986 edition of Computing Now! features an extensive look at the construc-

tion of the SLOTH board and a sample program for it. Other issues carry some basic SLOTH applications... timers, controllers and other things that can be made with the SLOTH. However, the low cost and flexibility of the SLOTH will unquestionably give you countless ideas for projects of your own.

The SLOTH can be whatever you want it to be... it's the most interesting electronics project on the planet. The complete SLOTH package is available for only \$37.95.



# ALMOST FREE™ GAMES

## AFGAMES 1

**CARD** is a simple draw poker game. In addition to genuinely random play, you can shoot it if it cheats without having to worry about its brothers coming after you.

**CASTLE** remains one of the most fun public domain computer games yet devised. Wander around a deserted castle collecting things and trying to get out.

**CHESSII** is a sophisticated chess game in which you can actually pick up and move your pieces. Features multiple look ahead levels. Requires CGA or EGA card.

**EGARIDS** is a brilliantly executed Asteroids game for EGA and VGA cards. If you get crunched by an asteroid, you suck vacuum. This version corrects the incompatibilities many users encountered with the one we previously offered.

**FROGGER** is a PC version of the classic arcade game. Try to get your frog across the road without him winding up splattered by the traffic. Requires a CGA or EGA card.

**HAUNT** is a text based adventure game in which you work your way through a large, haunted house with an endless plethora of rooms and objects.

**LINKFOUR** is a computerized version of the popular Connect Four vertical checkers game. Try to get four coloured dots in a row before the computer does. A classic puzzle. Requires a CGA or EGA card.

**PACKGAL** is an ASCII based version of PacMan. It plays like the wind, though, and is every bit as exciting as the arcade version... except that it doesn't inhale quarters.

**PINBALL2** simulates the action of a pinball machine. This one has all sorts of traditional pinball phenomena, including flippers, out lanes, kickers, gates and so on. Requires a CGA or EGA card.

**TREK** lets you tear through space meeting interesting new life forms and slaughtering them. It's a complex graphic space game with lots of action and even a plot of sorts. Requires a CGA or EGA card.

**WILLY** is the strange saga of willy the worm. In this episode, you get to help Willy go home. Willy is a graphic arcade game clearly written by someone a little warped. Requires a CGA or EGA card.

\$19.95

## AFGAMES 2

**BRICKS** is a classic implementation of "Little Brick Out", a game which dates back to the earliest personal computer. Kill bricks and relive a bit of history.

**FLEES** is a lightning fast, arcade quality alien slaughter game... get the space fleas a' for they get you. Slaughter and green blood abound. Requires an EGA card.

**PANGO** is a strange little arcade game. You wander around kicking the hell out of bricks and squashing bees. It's fast and peculiar.

**PIRATE** is a huge graphic adventure game in which you wander through tunnels searching for buried treasure. The pictures are good, the plot is clever and gory.

**PITFALL** pits you against the most dreaded space enemy of all...gravity. Pilot your ship down through the pit without getting mashed on the rocks. Works with any video card.

**RIBIT2** is the best public domain implementation of frogger we've encountered for a PC. Get your frog across the highway without having it run over and turned into french cooking.

**ROUND42** is a peculiar little effort along the lines of space invaders. It's fast and evil, and will take you a while to get the better of it.

**STRIKER** puts you in command of an attack copter flying into enemy territory. It's all done with pretty slick graphics, from the chopper itself to the missiles which will blow you into the next game room.

**SUBCHASE** is a graphic war game. You sail along dropping depth charges on unsuspecting subs.

\$19.95

## AFGAMES 3

**CAPTAIN COMIC** is the best video game ever written for the PC... commercial or otherwise. It's along the lines of Dark Castle on the Mac... you guide your little purple faced hero through a complex graphic world, picking up things and killing life forms. It's wild, fast, brilliantly conceived and enjoyable beyond words. Requires EGA or VGA card.

**3-DEMON** is three dimensional Pac Man. Wander through corridors picking up food pellets and avoiding ghosts. Requires CGA card.

**QIX** is an ASCII version of the arcade game. It's fast and runs on even the simplest PC.

**RACECAR** is a brilliant ASCII game that lets you drive through a writhing, debris strewn course of death and disaster.

**SEAHUNT** is a computerized Battleship game. It involves strategy, skill and a grasp of military tactics. You also have to like sinking ships.

\$19.95

## AFGAMES 4

**SUSAN** is a straight text adventure style game. The object of the game is to talk Susan into bed. Not exactly reluctant, Susan is not an easy date, either. This game contains adult situations, and should not be played by ruggies... who won't understand it anyway. It's good clean dirty fun, playable on any machine.

**PODWARS** is a fast ASCII graphics game in which you get to cruise around levels of a space ship picking up things and killing other life forms. At least, it looks like a space ship... in the proper existential style of these things, one can never be quite sure. All that quest and slaughter is a lot of fun, in any case. Playable on any machine.

**STAR GOOSE** is a brilliantly conceived, gloriously executed graphics arcade game. It lets you fly a space ship over very weird alien terrain, blowing things up, flying into the jaws of death... literally... and picking up giant floating eyeballs. If the explanation is already leaving you behind, you really should play Star Goose and find out what it's all about. Requires EGA or VGA card.

**QUAD ALIENS** is the strangest thing ever to infest a computer, and the mind which devised it was obviously pretty warped. The plot is all but indescribable... you get to wander around rooms that look like Luke Skywalker's worst nightmare, pushing things out of the way while you try to keep a reactor from going critical and blowing you to kingdom come. Even if you never work your way through it all... which is quite possible considering its complexity... Quad Aliens is worth it just to watch all the action. Requires a VGA card.

\$19.95





## SOFTWARE CATALOGUE ORDER FORM

## SOFTWARE

PC/MS-DOS	PRICE	QTY	AMOUNT
Almost Free PC Volume 29 (AFSPC29)	\$19.95		
Almost Free PC Volume 30 (AFSPC30)	\$19.95		
Almost Free PC Volume 31 (AFSPC31)	\$19.95		
Almost Free PC Volume 32 (AFSPC32)	\$19.95		
Almost Free PC Volume 33 (AFSPC33)	\$19.95		
Almost Free PC Volume 34 (AFSPC34)	\$19.95		
Almost Free PC Volume 35 (AFSPC35)	\$19.95		
Almost Free PC Volume 36 (AFSPC36)	\$19.95		
Almost Free PC Volume 37 (AFSPC37)	\$19.95		
Almost Free PC Volume 38 (AFSPC38)	\$19.95		
Almost Free PC Volume 39 (AFSPC39)	\$19.95		
Almost Free PC Volume 40 (AFSPC40)	\$19.95		
Almost Free PC Volume 41 (AFSPC41)	\$19.95		
Almost Free PC Volume 42 (AFSPC42)	\$19.95		
Almost Free PC Volume 43 (AFSPC43)	\$19.95		
Almost Free PC Volume 44 (AFSPC44)	\$19.95		
Almost Free PC Volume 45 (AFSPC45)	\$19.95		
Almost Free PC Volume 46 (AFSPC46)	\$19.95		
Almost Free PC Volume 47 (AFSPC47)	\$19.95		
Almost Free PC Volume 48 (AFSPC48)	\$19.95		
Almost Free PC Volume 49 (AFSPC49)	\$24.95		
Almost Free PC Volume 50 (AFSPC50)	\$24.95		
Almost Free PC Volume 51 (AFSPC51)	\$24.95		
Almost Free PC Volume 52 (AFSPC52)	\$24.95		
Almost Free PC Volume 53 (AFSPC53)	\$24.95		
Best of Almost Free Software Volume 1 (AFSEST1)	\$19.95		
Best of Almost Free Software Volume 2 (AFSEST2)	\$19.95		
Best of Almost Free Software Volume 3 (AFSEST3)	\$19.95		
Best of Almost Free Software Volume 4 (AFSEST4)	\$19.95		
Best of Almost Free Software Volume 5 (AFSEST5)	\$19.95		
Best of Almost Free Software Volume 6 (AFSEST6)	\$19.95		
LaserJet Fonts Volume 1 (AFLJ1)	\$19.95		
LaserJet Fonts Volume 2 (AFLJ2)	\$19.95		
Games Disk Volume 1 (AFGAMES1)	\$19.95		
Games Disk Volume 2 (AFGAMES2)	\$19.95		
Games Disk Volume 3 (AFGAMES3)	\$19.95		
Games Disk Volume 4 (AFGAMES4)	\$19.95		
Executive Software Series Volume 1 (EXEC1)	\$19.95		
Executive Software Series Volume 2 (EXEC2)	\$19.95		
Executive Software Series Volume 3 (EXEC3)	\$19.95		
Executive Software Series Volume 4 (EXEC4)	\$19.95		
Executive Software Series Volume 5 (EXEC5)	\$19.95		
Executive Software Series Volume 6 (EXEC6)	\$19.95		
Executive Software Series Volume 7 (EXEC7)	\$24.95		
Executive Software Series Volume 8 (EXEC8)	\$24.95		
Executive Software Series Volume 9 (EXEC9)	\$19.95		
Executive Software Series Volume 10 (EXEC10)	\$19.95		
Electronics & Technology Series Volume 1 (ETT1)	\$19.95		
Almost Free AutoCAD Volume 1 (CAD1)	\$19.95		
Hard Drive Survival Kit (AFSHD)	\$19.95		
Almost Free Business Software (BUSN1)	\$19.95		
Ventura Survival Disk Volume 1 (AFVENT1)	\$19.95		
Microsoft Windows ToolBox Vol. 1 (AFMICRO1)	\$19.95		
The SLOTH	\$37.95		
SUBTOTAL			

TITLE	PRICE	QTY	AMOUNT
Specify PC or Macintosh format:			
Ventura ClipArt Volume 1 (AFCLIP1)	\$19.95		
Ventura ClipArt Volume 2 (AFCLIP2)	\$19.95		
Ventura ClipArt Volume 3 (AFCLIP3)	\$19.95		
Ventura ClipArt Volume 4 (AFCLIP4)	\$19.95		
Ventura ClipArt Volume 5 (AFCLIP5)	\$19.95		
Ventura ClipArt Volume 6 (AFCLIP6)	\$19.95		
Ventura ClipArt Volume 7 (AFCLIP7)	\$19.95		
Ventura ClipArt Volume 8 (AFCLIP8)	\$19.95		
Ventura ClipArt Volume 9 (AFCLIP9)	\$19.95		
Ventura ClipArt Volume 10 (AFCLIP10)	\$19.95		
Ventura ClipArt Volume 11 (AFCLIP11)	\$19.95		
Ventura ClipArt Volume 12 (AFCLIP12)	\$19.95		
LaserArt Volume 1 (AFLASER1)	\$19.95		
Educational ClipArt Volume 1 (EDUCLIP1)	\$19.95		
Educational ClipArt Volume 2 (EDUCLIP2)	\$19.95		
Educational ClipArt Volume 3 (EDUCLIP3)	\$19.95		
COLOUR CLIPART			
Volume 1 GIF® Images (specify format)* (AFGIF1)	\$19.95*		
Volume 2 GIF® Images (specify format)* (AFGIF2)	\$19.95*		
Volume 3 GIF® Images (specify format)* (AFGIF3)	\$19.95*		
Volume 4 GIF® Images (specify format)* (AFGIF4)	\$19.95*		
Volume 5 GIF® Images (specify format)* (AFGIF5)	\$24.95*		
GIF® Users Kit (GIFKIT)	\$24.95*		
PC PaintBrush® Comp.(specify format)* (AFPCX1)	\$25.95*		

\*On 1.2 megabyte disks. \$31.95 on dual density 360K disks

## MACINTOSH

Almost Free Macintosh Volume 1 (AFMAC1)	\$24.95	
Almost Free Macintosh Volume 2 (AFMAC2)	\$24.95	
Almost Free Macintosh Volume 3 (AFMAC3)	\$24.95	
Almost Free Macintosh Volume 4 (AFMAC4)	\$24.95	
Almost Free Macintosh Volume 5 (AFMAC5)	\$24.95	
Almost Free Macintosh Volume 6 (AFMAC6)	\$24.95	

SUBTOTAL:

8% P.S.T. (Ontario residents):

POSTAGE & HANDLING (\$1.50):

TOTAL:

FORMAT: 5.25" disks will be shipped unless otherwise instructed.

**CUSTOMER POLICY:** This software has been collected from public access bulletin boards and/or has been placed directly in the public domain by its authors. It is all believed to be in the public domain, or offered as "shareware". As shareware, users of these programs are requested to pay registration fees to their authors, which may entitle you to additional updates, support and documentation. Note that the fee charged for this disk defers our cost in collecting and distributing the software only, it does not replace any requested shareware contributions. This will help to ensure a continuing supply of high quality shareware available at reasonable prices. If you try out this disk, and do not feel that it is fair value, you may return it for a refund or exchange it for a different disk with no questions asked. We do not sell software to people who cannot use it. If you have trouble with disk, you are welcome to call our free technical support service at (416) 445-5600 during normal business hours. Please be prepared to tell us the exact make and model of your computer and the disk and program you are having difficulty with. Please note that we cannot be responsible for any loss, damage or expense resulting from your use of this software, however caused. If you are unable to read your disk, it has probably been corrupted in the mail. You need not call us in this case. Simply return the disk to our software department with a note requesting a replacement. It will be shipped immediately. Please note that these disks do presuppose a reasonable familiarity with your computer. If you are very new to your system, we strongly recommend that you familiarize yourself with it before attempting to use this software.

NAME \_\_\_\_\_

COMPANY \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_

PROVINCE \_\_\_\_\_

POSTAL CODE \_\_\_\_\_

PHONE \_\_\_\_\_

SUBSCRIBER? CN! ETT CIE

CHEQUE ENCLOSED PLEASE CHARGE MY:

VISA AMERICAN EXPRESS MASTERCARD

CARD NUMBER \_\_\_\_\_

EXPIRY DATE \_\_\_\_\_

SIGNATURE \_\_\_\_\_

SEND TO: MOORSHEAD PUBLICATIONS

1300 Don Mills Road, North York, Ontario M3B 3M8

(416)445-5600 FAX: 416-445-8149.





# B A B A N I

## BP 170: AN INTRODUCTION TO COMPUTER PERIPHERALS \$10.00

This book describes and explains how to use a variety of different types of computer equipment in as non-technical a way as possible.

## BP 230: A CONCISE INTRODUCTION TO "GEM" \$11.80

Written as an introduction for new users of GEM, this book is also structured to provide a convenient source of reference for more experienced users, and can also act as a quick "refresher" if you haven't used GEM for some time. This book covers all versions of GEM up to release 3.01, including versions supplied with the Amstrad PC and Atari ST computers.

## BP 257: AN INTRODUCTION TO AMATEUR RADIO \$14.00

Topics covered in this book include the basic aspects of the hobby, such as operating procedures, jargon and setting up a station. Technical topics include propagation, receivers, transmitters and aerials etc.

## BP 265: MORE ADVANCED USES OF THE MULTIMETER \$11.80

This book is intended as a follow-up to BP239, and also should be of value to anyone who already understands the basics of voltage testing and simple component testing.

## BP 261: A CONCISE INTRODUCTION TO LOTUS 1-2-3 \$11.80

If you're a PC user and want to get to grips with Lotus 1-2-3, then this book will teach you how to do just that in the shortest and most effective way.

## BP 248: TEST EQUIPMENT CONSTRUCTION \$11.80

This book describes in detail how to construct some simple and inexpensive, but extremely useful, pieces of test equipment.

## BP 245: DIGITAL AUDIO PROJECTS \$11.80

This book takes a look at the basic principles involved in converting an audio signal into digital form and then converting it back to an analogue signal again. It also contains practical circuits for constructors to build and experiment with.

## BP 251: COMPUTER HOBBYISTS HANDBOOK \$23.80

This book provides a range of useful reference material in a single source so that it can be quickly and easily located. The subjects covered include microprocessors and their register sets; interfacing serial, parallel, monitor, games and Midi ports; numbering systems; Midi codes; operating systems and computer graphics.

## BP 247: MORE ADVANCED MIDI PROJECTS \$11.80

This book includes circuits for a MIDI indicator, THRU box, merge unit, code generator, pedal, programmer, channeliser and analyser.

## BP 260: A CONCISE INTRODUCTION TO OS/2 \$11.80

For the multitasking PC user wanting to get the most out of their computer in efficiency and productivity.

## BP 264: A CONCISE ADVANCED USER'S GUIDE TO MS-DOS \$11.80

This book is for the PC user that is looking for ways to improve their system's efficiency and productivity, while learning something new.

## BP 256: AN INTRODUCTION TO LOUDSPEAKERS AND ENCLOSURE DESIGN \$11.80

This book explores many types of enclosures and drive units. Cross-over units are also explained, the various types, how they work, the distortions they produce and how to avoid them.

## 246: MUSICAL APPLICATIONS OF THE ATARI STs \$15.00

A wide selection of topics is covered, including the internal sound chip, MIDI, applications programs such as sequencing and score writing, etc. Simple but useful add-on projects and MIDI programming.

## BP240: REMOTE CONTROL HANDBOOK \$12.00

Includes remote control systems, transmission links, digital electronics, methods of control, decoders, etc.

## BP111: AUDIO \$14.00

Covers a wide range of material from analysis of the sound wave, mechanism of hearing, acoustics, microphones and loudspeakers, amplifiers, and magnetic disc recording.

## BP239: GETTING THE MOST FROM YOUR MULTIMETER \$9.00

This book is aimed at beginners in electronics. Using the simple component and circuit testing techniques in this book the reader should be able to confidently tackle servicing of most electronic projects.

## BP53: PRACTICAL ELECTRONIC CALCULATIONS AND FORMULAE \$11.75

A book that bridges the gap between complicated technical theory and the "cut and try" method.

## BP174: MORE ADVANCED ELECTRONIC MUSIC PROJECTS \$12.00

Complementing Book BP74, "Electronic Music Projects", BP174 provides projects, such as a flanger, a phaser, mini-chorus and ring modulators, percussion synths, etc. Each project has an Introduction circuit diagram and constructional notes.

## BP113: 30 SOLDERLESS BREADBOARD PROJECTS - BOOK 2 \$9.00

A companion to BP107. Describes a variety of projects that can be built on plug-in breadboards using CMOS logic IC's. Each project contains a schematics, parts list and operational notes.

## BP150: AN INTRO TO PROGRAMMING THE SINCLAIR QL \$7.80

Helps the reader make the best use of the Sinclair QL's almost unlimited range of features.

## BP192: MORE ADVANCED POWER SUPPLY PROJECTS \$8.00

A companion to BP76, this book covers essential switched mode supplies, precision regulators, tracking regulators, computer-controlled supplies, etc.

## BP222: SOLID STATE SHORT WAVE RECEIVER FOR BEGINNERS \$7.80

In this book, R.A. Penfold has designed and developed several modern solid state short wave receiver circuits that will give a fairly high level of performance, despite the fact that they use only relatively few and inexpensive components.

## BP197: INTRODUCTION TO THE AMSTRAD PCs \$20.00

The Amstrad PC is an MS-DOS computer for general and business use. This book explains all you need to know to start computing.

## BP48: ELECTRONIC PROJECTS FOR BEGINNERS \$7.80

F.G. Rayer, T. Eng. (CEI), Assoc.IERE In this book, the newcomer to electronics will find a wide range of easily made projects. Also, there are a considerable number of actual components and wiring layouts, to aid the beginner.

## BP135: SECRETS OF THE COMMODORE 64 \$5.85

This book is intended as a beginner's guide to the Commodore 64.

## BP155: INTERNATIONAL RADIO STATIONS GUIDE \$9.00

An invaluable aid in helping all those who have a radio receiver to obtain the maximum entertainment value and enjoyment from their sets.

## BP130: MICRO INTERFACING CIRCUITS - BOOK 1 \$9.00

Aimed at those who have some previous knowledge of electronics, but not necessarily an extensive one, the basis of the book is to help the individual understand the principles of interfacing circuits to microprocessor equipment.

## BP131: MICRO INTERFACING CIRCUITS - BOOK 2 \$9.00

Intended to carry on from Book 1, this book deals with practical applications beyond the parallel and serial interface. "Real world" interfacing such as sound and speech generators, temperature, optical sensors, and motor controls are discussed using practical circuit descriptions.

## BP74: ELECTRONIC MUSIC PROJECTS \$10.00

R.A. Penfold Although one of the more recent branches of amateur electronics, electronic music has now become extremely popular. The purpose of this book is to provide the constructor with a number of practical circuits for the less complex items of electronic music equipment, including such things as a Fuxx Box, Waa-Waa Pedal, Sustain Unit, Reverberation and Phaser Units, Tremelo Generator, etc.

## BP51: ELECTRONIC MUSIC AND CREATIVE TAPE RECORDING \$5.85

This book sets out to show how Electronic Music can be made at home with the simplest and most inexpensive equipment.

## BP110: HOW TO GET YOUR ELECTRONIC PROJECTS WORKING \$7.80

R.A. Penfold We have all built circuits from magazines and books only to find that they did not work correctly, or at all, when first switched on. This book will help the reader overcome these problems by indicating how and where to start looking for many of the common faults that can occur when building up projects.

## BP86: AN INTRODUCTION TO BASIC PROGRAMMING TECHNIQUES \$5.85

This book is based on the author's own experience in learning BASIC and also in helping others, mostly beginners to programming, to understand the language.

## BP234: TRANSISTOR SELECTOR GUIDE \$15.00

Lists of British, European and eastern transistor characteristics make it easy to find replacements by part number or specifications. Devices are grouped by voltage, current, power, etc., includes surface-mount conversions.

## BP233: ELECTRONIC HOBBYIST HANDBOOK \$15.00

A single source of easily located information: colour codes, pinouts, basic circuits, symbols, etc.

## BP101: HOW TO IDENTIFY UNMARKED IC's \$1.95

An unusual and fascinating chart that is highly recommended to all those interested in electronics and which will hopefully pay for itself many times over, by enabling the reader to use IC's that might otherwise have been scrapped.

## BP121: HOW TO DESIGN AND MAKE YOUR OWN PCBs \$5.85

The purpose of this book is to familiarize the reader with both simple and more sophisticated methods of producing printed circuit boards. The book emphasizes the practical aspects of printed circuit board designs and construction.

## BP125: 25 SIMPLE AMATEUR BAND AERIALS \$5.85

This book describes how to build 25 amateur band aerials. The designs start with the simple dipole and proceed to beam, triangle and even a mini-rhombic.

## BP180: ELECTRONIC CIRCUITS FOR THE COMPUTER CONTROL OF MODEL RAILWAYS \$9.00

Shows how home computers can easily be applied to the control of model railroads and other quite sophisticated control. A variety of projects are discussed as well as circuits for train position sensing, signal and electric points control, etc.

## BP100: AN INTRODUCTION TO VIDEO \$5.85

For the person who's just, or is about to buy or rent video equipment but is 'n't sure what it's all about.

## BP78: PRACTICAL COMPUTER EXPERIMENTS \$5.25

The aim of this book is to enable the reader to simply and inexpensively construct and examine a number of basic computer circuit elements and gain a fuller understanding of how the computer "chip" works.

## BP185: ELECTRONIC SYNTHESIZER CONSTRUCTION \$9.00

With this book a relative beginner should be able to build, with a minimum of difficulty and at a reasonably low cost, a worthwhile monophonic synthesizer and also learn a great deal about electronic music synthesis in the process.

## BP92: ELECTRONICS SIMPLIFIED - CRYSTAL SET CONSTRUCTION \$5.25

This is a book written especially for those who wish to participate in the intricacies of electronics.



# BOOKS

## BP115: THE PRE-COMPUTER BOOK

\$5.85

Aimed at the absolute beginner with no knowledge of computing, this entirely non-technical discussion of computer bits and pieces and programming is written mainly for those who do not possess a microcomputer but intend to one day own one.

## BP72: A MICROPROCESSOR PRIMER

\$5.25

In an attempt to give painless approach to computing, this inexpensive book will start by designing a simple computer and then the shortcomings of this simple machine will be discussed and the reader is shown how these can be overcome.

## BP42: 50 SIMPLE L.E.D. CIRCUITS

\$5.85

Contains 50 interesting and useful circuits and applications, covering many different branches of electronics, using one of the most inexpensive and available components.

## BP85: INTERNATIONAL TRANSISTOR EQUIVALENTS GUIDE

\$9.00

Designed to help the user find possible substitutes for a popular user-oriented selection of modern transistors and includes devices produced by over 100 manufacturers.

## BP140: DIGITAL IC EQUIVALENTS AND PIN CONNECTIONS

\$15.00

Shows equivalents and pin connections of a popular user-oriented selection of Digital Integrated Circuits. Includes European, American and Japanese devices.

## BP136: SIMPLE INDOOR AND WINDOW AERIALS

\$7.00

People living in apartments who would like to improve shortwave listening can benefit from this book on optimizing the indoor aerial.

## BP147: AN INTRODUCTION TO 6502 MACHINE CODE

\$10.00

The popular 6502 microprocessor is used in many home computers; this is a guide to beginning assembly language.

## BP156: AN INTRODUCTION TO QL MACHINE CODE

\$10.00

The powerful sinclair QL microcomputer has some outstanding capabilities in terms of its internal structure. With a 32-bit architecture, the QL has a large address range, advanced instructions which include multiplication and division. These features give the budding machine code programmer a good start at advanced programming methods. This book assumes no previous knowledge of either the 68008 or machine code programming.

## BP59: SECOND BOOK OF CMOS IC PROJECTS

\$7.80

This book carries on from its predecessor and provides a further selection of useful circuits, mainly of a simple nature. The book is well within the capabilities of the beginner and more advanced constructor.

## BP258 LEARNING TO PROGRAM IN C

\$19.00

This book is a guide to C programming. C statements are introduced and explained with the help of simple programs.

## BP141: LINEAR IC EQUIVALENTS AND PIN CONNECTIONS

\$23.80

Adrian Michaels

Find equivalents and cross-references for both popular and unusual integrated circuits. Shows details of functions, manufacturer, country of origin, pinouts, etc... includes National, Motorola, Fairchild, Harris, Intersil, Philips, ADC, AMD, SGS, Teledyne, and many others.

## BP7: RADIO AND ELECTRONICS COLOUR CODE AND DATA CHART

\$3.00

Opens out to Wall Chart and includes many Radio & Electronics Colour Codes in use in UK, USA, Europe and Japan. Covers Resistors, Capacitors, Transformers, Field Coils, Fuses, Battery Leads, etc.

## BP225: A PRACTICAL INTRODUCTION TO DIGITAL ICs

\$7.00

This book deals mainly with TTL type chips such as the 7400 series. Simple projects and a complete practical construction of a Logic Test Circuit Set are included as well as details for a more complicated Digital Counter Timer project.

## BP88: HOW TO USE OP-AMPS

\$11.80

E.A. Parr

A designer's guide covering several op-amps, serving as a source book of circuits and a reference book for design calculations. The approach has been made as non-mathematical as possible.

## BP84: DIGITAL IC PROJECTS

\$7.80

F.G. Rayer, I. Eng. (CEI), Assoc.IERE.

This book contains both simple and more advanced projects for the reader developing a knowledge of the workings of digital circuits. To help the newcomer to the hobby the author has included a number of board layouts and wiring diagrams.

## ELEMENTS OF ELECTRONICS — AN ON-GOING SERIES

\$11.80 EACH

OR ALL 5 BOOKS FOR \$44.00

F.A. Wilson, C.G.I.A., C.Eng.,

Although written for readers with no more than ordinary arithmetical skills, the use of mathematics is not avoided, and all the math required is taught as the reader progresses. Each book is a complete treatise of a particular branch of the subject and therefore, can be used on its own with one proviso, that the later books do not duplicate material from their predecessors, thus a working knowledge of the subjects covered by the earlier books is assumed.

BP62: BOOK 1. This book contains all the fundamental theory necessary to lead to a full understanding of the simple electronic circuit and its main components.

BP63: BOOK 2. This book continues with alternating current theory without which there can be no comprehension of speech, music, radio, television or even the electricity utilities.

BP64: BOOK 3. Follows on semiconductor technology, leading up to transistors and integrated circuits.

BP77: BOOK 4. A complete description of the internal workings of microprocessor.

BP89: BOOK 5. A book covering the whole communication scene.

## BP194: MODERN OPTO DEVICE PROJECTS

\$9.00

This book provides a number of practical designs for beginners and experienced project builders. These projects utilize a range of modern opto-electric devices, including such things as fibre optics, ultra-bright LEDs and passive IR detectors.

## BP37: 50 PROJECTS USING RELAYS, SCR's & TRIACS

\$7.80

F.G. Rayer, I. Eng. (CEI), Assoc.IERE.

Relays, bi-directional triodes (TRIACs), and silicon controlled rectifiers (SCRs), have a wide range of applications in electronics today. This book gives practical working circuits which should present a minimum of difficulty for the enthusiast. Most circuits include a wide latitude in component values allowing easy modification and adaptation.

## BP95: MODEL RAILWAY PROJECTS

\$7.80

Electronic projects for model railways are fairly recent and have made possible an amazing degree of realism. The projects covered included controllers, signals and sound effects: stripboard layouts are provided for each project.

## BP144: FURTHER PRACTICAL ELECTRONICS CALCULATIONS AND FORMULAE

\$15.00

This book covers many aspects of electronics where a knowledge and familiarity of the appropriate formulae is essential for a fuller understanding of the subject. An essential addition to the library of all those interested in electronics.

## BP44: IC 555 PROJECTS

\$10.00

E.A. Parr, B.Sc., C. Eng., M.I.E.E.

Every so often a device appears that is so useful that one wonders how life went on before it. The 555 timer is such a device included in this book are Basic and General Circuits, Motor Car and Model Railway Circuits, Alarms and Noise Makers as well as a section on the 556, 558 and 559 timers.

## BP94: ELECTRONIC PROJECTS FOR CARS AND BOATS

\$7.80

R.A. Penfold  
Projects, fifteen in all, which use a 12V supply are the basis of this book. Included are projects on Windscreen Wiper Control, Courtesy Light Delay, Battery Monitor, Cassette Power Supply, Lights Timer, Vehicle Immobiliser, Gas and Smoke Alarms.

## BP49: POPULAR ELECTRONIC PROJECTS by R.A. Penfold

\$10.00

Includes a collection of the most popular types of circuits and projects which will provide a number of designs to interest most constructors. The projects are divided into four basic types. Radio Projects, Audio Projects, Household Projects

## BP118: PRACTICAL ELECTRONIC BUILDING BLOCKS — BOOK 2

\$7.60

R.A. Penfold

This sequel to BP117 is written to help the reader create and experiment with his own circuits by combining standard type circuit building blocks. Circuits concerned with generating signals were covered in Book 1, this one deals with processing signals.

## BP98: POPULAR ELECTRONIC CIRCUITS, BOOK 2

\$9.00

R.A. Penfold

70 plus circuits based on modern components.

## BP127: HOW TO DESIGN ELECTRONIC PROJECTS

\$9.00

Although information on stand circuits blocks is available, there is less information on combining these circuit parts together. Practical examples are used and each is analysed to show what each does and how to apply this to other designs.

## BP195: AN INTRODUCTION TO SATELLITE TELEVISION

\$15.00

For the absolute beginner or anyone thinking about purchasing a satellite TV system, the story is told as simply as such a complex one can be.

## BP106: MODERN OP-AMP PROJECTS by R.A. Penfold

\$7.80

Features a wide range of constructional projects which make use of op-amps including low-noise, low distortion, ultra-high input impedance, high slew-rate and high output current types.

## BP107: 30 SOLDERLESS BREADBOARD PROJECTS - BOOK 1

\$9.00

R.A. Penfold

"A Solderless Breadboard" is simply a special board on which electronic circuits can be built and tested. The components used are just plugged in and unplugged as desired. The 30 projects in this book have been designed to be built on a "Verobloc" breadboard. Wherever possible the components used are common to several projects, hence with only a modest number of components it is possible to build, in turn, every project shown.

## BP122: AUDIO AMPLIFIER CONSTRUCTION

\$6.75

A wide circuit is given, from low noise microphone and tape head preamps to a 100W MOSFET type. There is also the circuit for 12V bridge amp giving 18W. Circuit board or stripboard layout are included. Most of the circuits are well within the capabilities of even those with limited experience.

## BP179: ELECTRONIC CIRCUITS FOR THE COMPUTER CONTROL OF ROBOTS

\$12.00

The main stumbling block for most would-be robot builders is the electronics to interface the computer to the motors, and the sensors which provide feedback from the robot to the computer. The purpose of this book is to explain and provide some relatively simple electronic circuits which bridge the gap.

## BABANI BOOKS EXCLUSIVELY AVAILABLE FROM

## MOORSHEAD PUBLICATIONS.

## ORDER YOUR SELECTIONS BY TELEPHONE: (416) 445-5600

## OR FAX: 416-445-8149 OR WRITE TO US AT 1300 DON

## MILLS ROAD, NORTH YORK, ONTARIO M3B 3M8





# Computer Parts Galore

316 College St. Toronto, Ontario, M5T 1S3

(416) 928-2161 - Sales, Service

(416) 924-0292 - 24 Hour Fax Line

(416) 535-6815 - No charge BBS

1-800-387-1385 - Toll Free Order Line

XT/AT/386 Systems	Components	Accessories
8088 Systems from \$499.00	· Motherboards	· Network Hardware
286 Systems from \$1000.00	· Hard Drives	· Network Software
386 Systems from \$1500.00	· Floppy Drives	· Cables / Switch Boxes
386 Systems from \$1800.00	· Peripheral Cards	· RS232 Adapters
	· Monitors	· Paper, Labels, Ribbons
	· Printers	· Accessories, Software
	· Modems/Fax Cards	· Cases/Power Supplies
	· Laser Printers/Supplies	· Upgrade Specialists

Call For the most up-to-date pricing. Detailed, itemized system quotes available in store or by fax.

## Specials:

· 25 Mhz 386-Cache Motherboard	\$2045.95
-32K High Speed Cache	
· 20 Mhz 386 Motherboard	\$1199.95
· 16 Mhz 386 SX Motherboard	\$595.95
· 16/20 Mhz 286 NEAT Motherboard	\$549.95
· 12 Mhz 286 Motherboard	\$299.95
· Bullet286E Motherboard	\$239.95
-Perfect Upgrade product for tired 8088 Machines	
-286 performance at XT prices	
· 2400 Baud External Modem	\$179.95
· 1200 Baud Internal Modem	\$49.95
-Hayes Compatible, previously installed	
-Software included	
· VGA Kit - Card and Monitor	\$649.95
-640x480 14" Monitor	
-256K 8 Bit Video Adapter	
· GVC 8 Bit VGA Card	\$224.95
-256K video ram, expandable to 512K	
· Twinhead Magic Combo Video Card	\$99.95
-MGA/CGA card, CGA emulation on TTL Mono Monitor	

## Deals:

· External 3rd Floppy Kit for AT/386	\$119.95
-Allows 3rd high density floppy in AT/386 Systems	
-Includes External Case, Card, Cable, drive not included	
-Compatible with AT HDD/FDD cntlr 3.5" or 5.25" models	
· High Density XT Multi-I/O Card	\$99.95
-360/720/1.2/1.4 floppy cntlr w/serial, par, clock, game ports	
· DFI HS-3000 Plus "Handy Scanner"	\$324.95
-4" wide, scans PCX,IMG,TIF format, perfect for DTP	
-Compatible with Ventura, Pagemaker and Wordperfect 5	
· Quickshot Joystick	\$19.95
· Quickshot AT Game Port -dual ports	\$19.95
· XT 40 Meg 42ms Hdisk Kit	\$439.95
· 40 Meg 28ms MFM Hdisk, ST251-1	\$524.95
· 63 Meg 28ms RLL Hdisk, ST277	\$534.95
· 72/104 Meg 28ms MFM/RLL Hdisk	\$949.95
· 40 Meg Tape Backup Unit	\$524.95
· Everex AT HDD/FDD 1:1 Controller	\$169.95
· Epson 1.44 Meg 3.5" Floppy Drive	\$149.95
· Adaptec AT HDD/FDD 1:1 Controller	\$269.95
-Very high performance RLL cntlr, w/look ahead cache	

## CPG - Hardware/Feeware Catalogue Offer:

Please send me a FREE copy of your Hardware Catalogue and please include a copy of your FEEWARE Catalogue-on-a-Disk. Over 400 titles are available, 1000's of programs. New disks are being added all the time. Stay up-to-date.

Single library disks \$5.00 each  
10 or more disks \$4.00 each

I understand no charge will be made for shipping.

Name: \_\_\_\_\_  
Company: \_\_\_\_\_  
Address: \_\_\_\_\_  
City: \_\_\_\_\_  
Prov: \_\_\_\_\_  
PCode: \_\_\_\_\_  
Fax #: \_\_\_\_\_



The only thing that's changed here is the name of the destination of the data read in from WOMBAT.DOC. Instead of going to *stdout*, the screen, it's going to *stdprn*, which is usually connected to the printer port LPT1. This little program, then, will print the contents of WOMBAT.DOC.

Consider this third variation.

```
FILE *fp,*destination;

puts("Hit P to print WOMBAT.DOC, any
other");
puts("key to view it");
if(getch()=='P') destination=stdprn;
else destination=stdout;

if((fp=fopen("WOMBAT.DOC","r"))!=
NULL){
while(fputc(fgetc(fp),destination)!=EOF);
fclose(fp);
}else puts("WOMBAT.DOC ain't there");
```

In this example, we've created a file pointer and sent the data from the file to it. The file pointer can be the printer or the screen, depending on whether we want to view or print the file. Alternately, the file pointer could really point to an open file. If you have a program which prints to the printer through *stdprn*, this is an easy way to implement a print to disk function — just assign the file pointer the value of *stdprn* instead of that of an open disk file with *fopen*.

Using this model for data handling, it might be a bit easier to understand how to deal with streamed file input and output. Allowing that *fp* is a file pointer to an open file and that *stdout* is the pseudo-pointer for the screen, you will observe that writing a character to the screen is handled like this:

```
fputc('A',stdout);
```

while writing a character to the file is handled like this:

```
fputc('A',fp);
```

The screen and the file behave more or less the same way. In both cases, the newly written byte will appear immediately after the most recently written byte. This will be at the cursor position on the screen and at the end of the file as it has been written to date for the disk file. If you think of a disk file as being simply a series of bytes, as the screen is, you should have no problem understanding how C deals with files.

## More File Modes

Files can do things which the screen cannot, and the analogy does start to fall apart after a while. For example, You can "seek" in a E&TT November 1989

file. The seeking mechanism under C allows you to define where in the file the next byte, or bytes, will be written to or read from. Allowing that we have a file of one kilobyte in length. If we open it to read and begin to read in bytes with the *fgetc* function, the bytes will be drawn from the beginning of the file. If we wanted to read from the five hundredth byte on, we would have to read in and throw away a lot of data, which is inefficient and very slow.

The *fseek* function allows us to position the file position pointer, that is, where the bytes will be read from, anywhere in the file at any time. If the opened file has a pointer *fp*, we can position its file position pointer to the five hundredth byte like this:

```
fseek(fp,500L,SEEK_SET);
```

The first argument to this function is obviously the file pointer. The second one is the number of bytes in from the head of the file — note, however, that we must make it a long value. Since files can be bigger than sixty-four kilobytes, anything which specifies a location within a file must do so in long numbers. Finally, the last argument must tell *fseek* whether 500L reflects the position relative to the start of the file, the end of the file or the current file position. Three constants are defined to reflect this — *SEEK\_SET* tells *fseek* to position the file's position pointer relative to the start of the file. We'll deal with the other modes at a later time.

If we read a byte from the file with *fgetc* after executing the above command, we should see the five hundredth byte returned. If we write to the file, assuming that the file has been opened for both reading and writing, the first byte we write will overwrite byte five hundred.

If you have a file which has been opened for both reading and writing you must do an *fseek* if you switch between these two functions.

There's another function which works nicely with *fseek*. The *ftell* function returns a long integer which specifies how far into the file next byte will be read from or written to. In other words, it returns the file position pointer. You can use this for all sorts of things. For example, this bit of code will return the size of the file which has been opened with the file pointer *fp*.

```
fseek(fp,0L,SEEK_END);
size=ftell(fp);
```

The variable *size* must be a long integer. The constant *SEEK\_END* tells

*fseek* to seek to the end of the file, or to as many bytes from the end as are specified by the second argument to *fseek*.

Having seeked to the end of the file, of course, the file position pointer might not be where you want it to be if you had plans to read data from the file. You could, of course, use *fseek* to return to the start of the file, but C also provides a shorthand version of this function. You can just

```
rewind(fp);
```

This returns the file position pointer of *fp* to the beginning of the file.

## Cooking with Rabbits

When you open a file using *fopen*, the second argument specifies the mode, as we discussed last month. This can be either binary mode, which means that bytes are read as bytes, or "cooked" mode, in which case they mostly are. The cooked mode is used when you're want to read ASCII files as ASCII.

When C wants to represent the end of a line, it uses the '\n' characters, that is, the "newline" character. When you are using the streamed file functions with a file opened in the cooked mode, any instances of carriage return line feed pairs will be converted to the newline character in the way in, and newlines will be converted to carriage returns and line feeds on the way out. In the binary mode, no conversion is performed.

In order to open a file for reading in cooked mode, you would do this:

```
fopen("FROGFILE.DOC","r");
```

To open a file in binary mode you would do this:

```
fopen("FROGFILE.BIN","rb");
```

There are several consequences of using cooked mode. For one thing, the numbers returned by *ftell* may not really reflect the file as you see it from your program, as newline characters are one byte which a carriage return line feed pair is two characters long. Likewise, using *fseek* might not place the file position pointer where you think. Cooked mode is usually used with text files, wherein these two functions don't apply for the most part.

Despite the added need for caution in using cooked mode, it can make using text files with C a great deal easier. We'll learn a bit more about how it works in the next installment of this series.



# Xenon Beacon

**A visual warning device that's self-contained, compact, splash proof and rechargeable.**

**CHRIS WALKER**

If you want to attract someone's attention to a scene, a flashing light is a good method to employ. This is because the human eye is very sensitive to sudden changes in light level, particularly towards the edge of the field of view. Flashing beacons are to be found wherever attention has to be promptly drawn to a hazard, warning sign or advertisement.

The beacon to be described here emits a powerful blast of light at a rate of approximately 1.5Hz and was initially designed for visibly locating portable amateur radio stations on hilltops. It has since found refuge in the car trunk where it can be used to warn other motorists of accidents, breakdowns, etc.

Xenon beacons can be bought quite cheaply, but most of them have two main drawbacks: they are not designed as portable units and their light output is not very high. This design satisfies both these criteria and the light can be seen at a distance in excess of two miles under favorable conditions. Being moisture-proof it is ideal for outdoor use.

Other uses include mountain rescue, sea rescue (take it out with you in the fishing boat) or just for fun at discos.

## Xenon Tube

The light source consists of a glass tube containing xenon gas with an electrode at each end; see Fig. 1. When the xenon atoms are excited by passing a high current through the gas, they emit an intense blue/white light. However, the gas is non-conducting at low voltages and in order to make it pass a current a potential difference of several thousand volts would be needed across the ends of the tube.

This is very inconvenient, and so a third "trigger" electrode is attached to the outside of the tube near the ends. In order to strike the gas (make it conduct) a voltage of about 350V is applied across the ends of the tube and a brief 6,000V pulse is applied to the trigger electrode. This causes the gas at the ends of the tube to ionize and conduct; this ionization very rapidly spreads along the tube and current flows from one end to the other causing the emission of light.

Radio Shack sells a strobe tube, the 272-1145, for replacement use and experimenting. You could also salvage one from a defunct photoflash, though the very small ones may overheat from the frequent flashing.

## Block Diagram

The outline operation of the Xenon  
E&T November 1989



Beacon is shown in Fig. 2. The circuit uses an inverter to step up the 12V supply, producing several hundred volts required for the xenon tube; an ordinary mains transformer used "in reverse" acts as the voltage-increasing component. Since transformers only work on AC, an oscillator is used to drive the primary winding.

The high voltage AC is rectified and used to charge up a high voltage storage capacitor. The voltage across the capacitor increases as the charge builds up and when it reaches about 350V a trigger circuit rapidly discharges the capacitor through the xenon tube, thus producing a bright flash.

The inverter then proceeds to recharge the capacitor and the cycle repeats.

### Circuit Diagram

The circuit of the beacon, divided into three discrete sections is shown in Fig. 3. The inverter is driven from a 12V rechargeable battery, protected by fuse FS1. S1 is an on/off switch which connects B1 to sockets SK1 and SK2 when the unit is switched off, thus allowing the battery to be charged in the case. The power supply is decoupled by capacitor C1.

NAND gate IC1c is wired to a Schmitt trigger inverter, and together with R1, VR1 and C2 it forms a relaxation oscillator. The square wave output from the oscillator is buffered

by gate IC1b and used to switch transistor TR2 which controls current through one half of the primary winding of transformer T1. (Note that in this circuit the primary is the low voltage winding.)

An inverted version of the oscillator signal from gate IC1a switches TR1 so that when current flows through TR1, TR2 is switched off, and vice-versa. TR1 and TR2 are Darlington devices having the high gain necessary to drive the transformer directly from CMOS gates.

Due to self-induction in T1 primary,

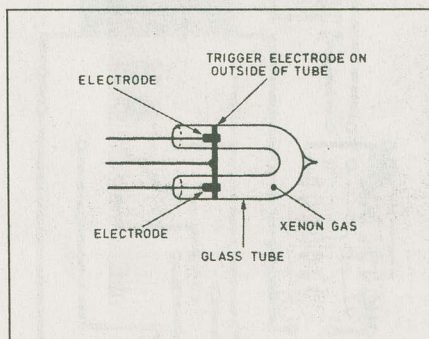


Fig. 1. The Xenon tube.

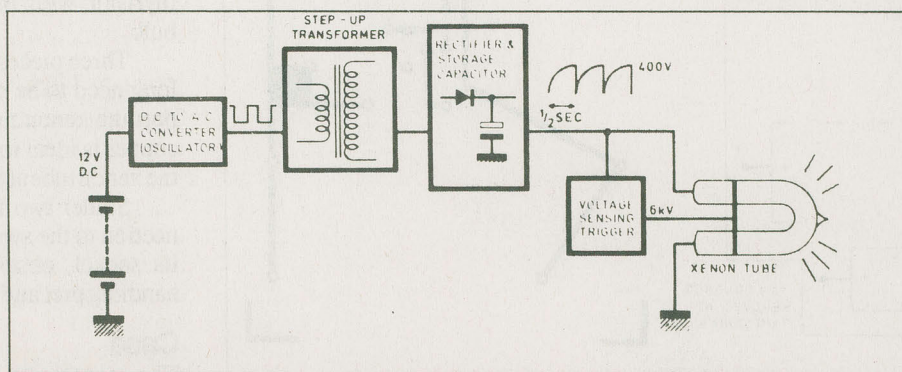


Fig. 2. Block diagram.

spikes of about 80V amplitude are produced each time TR1 and TR2 turn off. These spikes are stepped up in excess of 1,000V in T1 secondary, rectified by diodes D1 to D4 and used to charge capacitors C3 and V4.

### Trigger

As the voltage across C3 and C4 increases, capacitor C5 is charged via R4. R5, VR2 and R6 for a potential divider which feeds a fraction of the voltage across C5 to neon LP1 via R7. Thus the voltage across the neon increases to about 70V upon which the neon conducts and a positive voltage is applied to the gate of thyristor CSR1.

The thyristor triggers and conducts from anode to cathode, discharging C5 through the primary winding of trigger transformer T2. This induces a very high voltage pulse in the secondary of T2 which is used to strike the xenon tube X1; C3 and C4 then deposit their charge through the tube in a fast, high current surge.

Following this, thyristor CSR1 resets to its high impedance state and the process repeats as C3 and C4 charge again.

Notice that if, as may occasionally happen, the tube fails to strike upon the discharge of C5 through CSR1, then the thyristor will reset and C5 will recharge until neon LP1 conducts and the tube is triggered again: this process is repeated rapidly until the xenon tube fires.

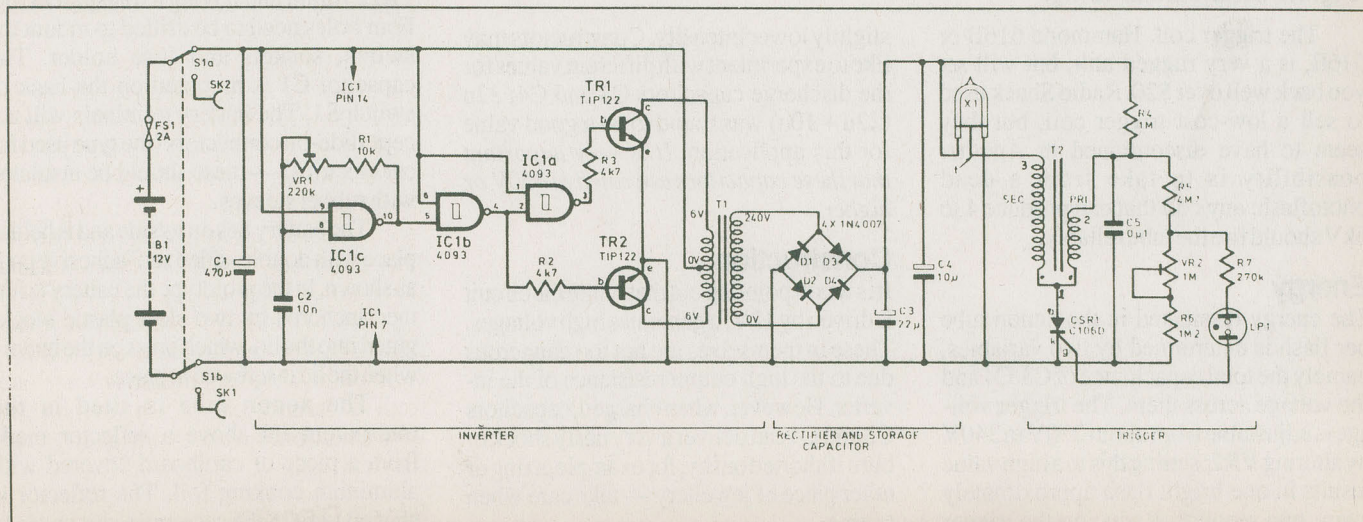


Fig. 3. Circuit diagram of the Xenon beacon. See the text for information on T1, T2 and the flash tube.  
E&T November 1989



# Variable Stabilized Power Supply

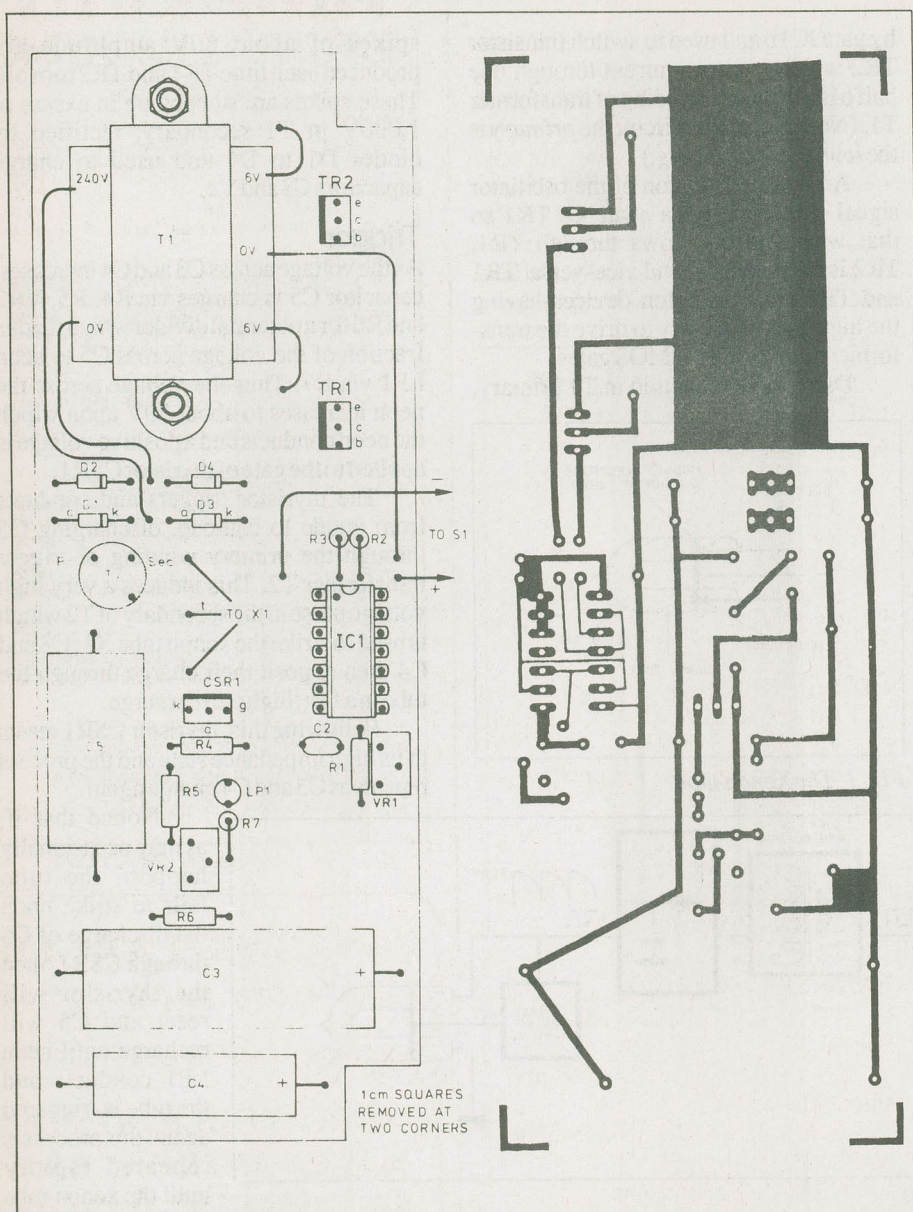


Fig. 4. PCB layout and wiring.

The trigger coil, Hammond 616B or 616E, is a very rugged unit, but will set you back well over \$20. Radio Shack used to sell a low-cost trigger coil, but they seem to have discontinued it. Another possibility is to take from a dead photoflash; any coil that can produce 4 to 6kV should fire the tube reliably.

## Energy

The energy dissipated in the xenon tube per flash is determined by two variables, namely the total capacitance of C3/C4 and the voltage across them. The trigger voltage is adjustable from about 220V to 340V by altering VR2; setting this to a high value results in one bright flash approximately every two seconds. Reducing the trigger voltage will give more rapid flashes of

slightly lower intensity. Constructors may like to experiment with different values for the discharge capacitors C3 and C4; 32u (22u + 10u) was found to be a good value for this application. *It is very important that these capacitors are rated at 450V or higher.*

## Construction

It is worth pointing out that while the circuit is driven by 12V, it generates high voltages. These in themselves are not too dangerous due to the high output resistance of the inverter. However, when charged, capacitors C3 and C4 can deliver a very nasty shock or burn if shorted out by, for example, a ring or other piece of jewellery — take care when testing.

All the main components are

mounted on a single-sided printed circuit board, the full size foil pattern of which is given in Fig. 4. Notice that two holes need to be drilled to mount T1 and two 1cm square pieces have to be removed at the corners if the recommended case is used.

Using the layout diagram in Fig. 4 as a guide, solder the small components into place first: the resistors, presets, capacitor C2, neon and diodes, observing the polarity of the latter. Insert the trigger transformer T2 — the recommended transformer will only fit the PCB in the correct orientation. If a different type is used, check the connections before soldering.

Fit the remaining capacitors checking that C3 and C4 are inserted the correct way around and then bolt transformer T1 into place, nuts uppermost. Solder the transformer connections to the circuit board.

The transistors should be fitted with small clip-on heatsinks and these are probably best attached before the devices are soldered into place. Insert the transistors with their tabs facing T1 and fit the thyristor with its *front* facing the neon bulb.

Three pieces of stout wire about 8cm long need to be soldered in place to support the xenon tube X1. 20-gauge tinned copper is ideal for the purpose. Do not fit the xenon tube at this stage.

Solder two insulated wires for connection to the switch and then fit IC1 into its socket, observing the usual CMOS handling precautions.

## Case

The prototype unit is housed in a waterproof plastic case measuring 150 x 110 x 70mm and having a transparent top. Four holes need to be drilled to mount the switch, sockets and fuse holder. The capacitor C1 is mounted on the back of switch S1. The battery terminals will accept slide-on connectors (the type used for car electrics) — these should be insulated with rubber sleeves.

The battery lies on its side and is held in place with double-sided self-adhesive pads as shown. In the prototype the battery is further anchored by two clear plastic blocks glued into the lid, which press on the battery when the lid is screwed in place.

The xenon tube is sited in the transparent lid above a reflector made from a piece of cardboard covered with aluminum cooking foil. The reflector is shaped to fit in the case and a slot needs to be cut to pass the wires to X1. It can be fas-



tened to the side of B1 with double-sided tape or similar, allowing it to be removed for servicing.

Using pliers, and being careful not to strain the glass, bend the wires of the xenon tube at right angles to the plane of the tube about 1cm from its ends. slip three 3cm lengths of sleeving over the tube support wires on the PCB and solder X1 to these wires so that the tube is positioned mid-way between the reflector and the lid of the box, trimming off surplus wire as necessary. Slide the sleeving up to the top of the vertical section of the wires and hold it in place with glue.

### Adjustments

Set both VR1 and VR2 at mid-position and apply power. Transformer T1 should be heard to whine and the xenon tube should flash at approximately 1.5Hz.

If a frequency counter or oscilloscope is available, connect it between 0V and pin 3 of IC1 and adjust VR1 until the inverter oscillator runs at a frequency of about 1.5kHz. If such equipment is not on hand, leave VR1 set at mid-position. The trigger voltage/flash rate is set as required by adjusting VR2.

The PCB can now be fastened into the case with adhesive pads and the lid screwed into place. Four rubber feet will improve the durability of the unit.

### Battery

The battery used in the prototype is a rechargeable 12V 1.2Ah sealed lead-acid type. It has a mass of 600g and fits snugly into the recommended case along with the PCB. It will give over three hours of continuous use.

These batteries are available in a variety of sizes/capacities and constructors wishing to leave the beacon running for long periods may like to consider using a battery with a higher capacity, although size and weight must be taken into account if the unit is to remain portable.

Indeed, the xenon beacon could be very successfully run from a car battery, via the cigarette lighter for instance.

It is possible to operate the unit from a 6V supply, the only modification being to replace transformer T1 for a type having a 3-0-3V "secondary" winding. The current consumption is increased and, due to inefficiencies in the transformer, the highest flash rate will probably be around 1Hz. The benefit of using a 6V supply is that smaller and lighter batteries may be used.

Finally, 12V sealed lead-acid batteries should be charged at a constant voltage of

13.5V although the maximum charging current should be restricted to 1A.

Failure to keep to these limits will cause the battery to expel excess hydrogen gas inside the box. In any case, the box should not be entirely sealed—a small vent hole around the sockets will prevent a pressure build up without affecting the moisture-proof characteristics. Ideally, the box lid should be removed when charging.

## PARTS LIST

### Resistors

- R1 10k
- R2, 34k7
- R4 1M
- R5 4M7
- R6 1M2
- R7 270k
- All 0.25W carbon

### Potentiometers

- VR1 220k
- VR2 1M
- Both vertical mounting presets

### Capacitors

- C1 470u 16V elec.
- C2 10n ceramic
- C3 22u 450V elec.
- C4 10u 450V elec.
- C5 0.1u 450V

### Semiconductors

- TR1, TR2 TIP122 npn Darlington
- D1 to D4 1N4007 1000V prv silicon diodes
- IC1 4093 CMOS quad 2-input NAND Schmitt trigger
- CSR1 C106D thyristor

### Miscellaneous

- T1 filament transformer, 120V/6.3VCT at 250mA or more, such as Hammond 166G6 or 166K6
- T2 xenon tube trigger transformer, Hammond 616B or 616E.
- X1 xenon tube
- LP1 miniature neon bulb
- B1 12V 1.2Ah sealed lead-acid battery
- FS1 20mm 2A fuse and holder
- S1 DPDT toggle switch

14-pin DIP socket; clip-on heat-sinks for TR1 and TR2 (TO220 case); waterproof plastic case, internal dimensions 150 x 110 x 70mm; connectors for B1; feet; 20 s.w.g. tinned copper wire; sleeving; materials for reflector.

## AMAZING SCIENTIFIC & ELECTRONIC PRODUCTS

PLANS—Build Yourself—All Parts Available in Stock

- LC7—BURNING CUTTING CO2 LASER.....\$20.00
- RUB4—PORTABLE LASER RAY PISTOL.....\$20.00
- TC07—3 SEPARATE TESLA COIL PLANS TO 1.5 MEV.....\$20.00
- IOG2—ION RAY GUN.....\$10.00
- GRA1—GRAVITY GENERATOR.....\$10.00
- EML1—ELECTROMAGNET COIL GUN/LAUNCHER.....\$8.00

KITS With All Necessary Plans

- MFT3K—FM VOICE TRANSMITTER 3MIRANGE.....\$59.50
- VWP7K—TELEPHONE TRANSMITTER 3MIRANGE.....\$49.50
- BTC3K—250,000 VOLT 10-14" SPARK TESLA COIL.....\$249.50
- LHC2K—SIMULATED MULTICOLOR LASER.....\$44.50
- BLS1K—100,000 WATT BLASTER DEFENCE DEVICE.....\$69.50
- N1G7—NEGATIVE ION GENERATOR KIT.....\$34.50
- PSP4K—TIME VARIANT SHOCK WAVE PISTOL.....\$59.50
- STA1K—ALL NEW SPACE AGE ACTIVE PLASMA SABER.....\$59.50
- PG5K—PLASMA LIGHTNING GLOBE KIT.....\$49.50
- S05K—SEE IN THE DARK VIEWER KIT.....\$199.50

ASSEMBLED With All Necessary Instructions

- BTC10—50,000 VOLT—WORLD'S SMALLEST TESLA COIL.....\$54.50
- LGU40—1MW HeNe VISIBLE RED LASER GUN.....\$249.50
- TAT30—AUTO TELEPHONE RECORDING DEVICE.....\$24.50
- ITM1—100,000 VOLT 20" AFFECTIVE RANGE INTIMIDATOR.....\$99.50
- LIST10—SNOOPER PHONE INFINITY TRANSMITTER.....\$169.50
- IPG70—INVISIBLE PAIN FIELD GENERATOR—MULTIMODE.....\$74.50

• CATALOG CONTAINING DESCRIPTIONS OF ABOVE PLUS HUNDREDS MORE AVAILABLE FOR \$1.00 OR INCLUDED FREE WITH ALL ABOVE ORDERS.

PLEASE INCLUDE \$3.00 PH ON ALL KITS AND PRODUCTS. PLANS ARE POSTAGE PAID. SEND CHECK, MO, VISA, MC IN US FUNDS.

**INFORMATION UNLIMITED**  
P.O. BOX 716, DEPT. ET AMHERST, NH 03031

Circle No. 17 on Reader Service Card

## CANADA'S LARGEST SPECIALTY RADIO STORE

AMATEUR AND SWL SUPPLIES BY:

**ARRL PUBLICATIONS,  
A.E.A., ASTRON, B&W,  
BUTTERNUT, DATONG,  
DELHI, KENWOOD,  
GROVE, GRUNDIG,  
HUSTLER, ICOM, JRC,  
KANTRONICS, MFJ,  
SANGEAN, SONY, YAESU,  
And Many More.**

CATALOGUE AVAILABLE FROM:

**COM-  
WEST  
Radio Systems Ltd.**

8179 Main St., Vancouver, B.C. V5X 3L2

FAX (604) 321-6560 PHONE 321-3200

Circle No. 18 on Reader Service Card



# An Interview with Philippe Kahn

A conversation with the founder of Borland International, Inc.

RICHARDEVERS

**P**hilippe Kahn's biography tells only a portion of his story. Prior to 1983, he achieved a Ph.D. equivalent degree in mathematics in Zurich studying under the auspices of Niklaus Wirth, the man who created the Pascal programming language. In 1983, Philippe Kahn founded Borland International with limited funds and minimal corporate experience. After convincing Byte Magazine to provide a full-page of ad space with extended payment terms, Borland's first product, the Turbo Pascal compiler, went from start to \$150,000 in sales in short order. Since then, Borland's sales have grown to \$90 million (US) in 1988.

Their products now include: Turbo Pascal, Turbo C, Turbo Assembler, Turbo Basic, Turbo Prolog, Turbo Debugger, Turbo Lightning, SideKick, SuperKey, Quattro (spreadsheet), Reflex (data base management), Paradox (relational database), Sprint (word processor), and Eureka (equation solver).

Aside from his time at Borland, he is an exercise enthusiast and avid sailer, holding a trans-Pacific sailing record. He lectures at colleges, universities and user-groups across the world, and is fluent in French, English, Spanish and German.

**EVERS:** In comparing your company's rendition of the start of Borland to that of Niels Alex Jensen of Jensen & Associates, a few contradictions exist. Can you tell a little more about Borland's early days?

**KAHN:** I don't know which contradictions.

**EVERS:** Oh, I'll brief you on that one. Niels has stated that Borland was originally started in the Netherlands by five partners

and that they wrote the original Turbo Pascal compiler. He also stated that they had hired you to run the North American division. Then they went off on their own to create their Modula implementation, and held off on the C compiler. When the Modula wasn't coming along too well, you pushed for the C compiler, bought the Wizard C compiler, and reworked it into Turbo C. They effectively slipped off onto their own to do Modula and you've continued to date with Borland.

**KAHN:** It's a little fantasy. Neither Niels nor the two guys associated with him wrote a single line of Turbo Pascal. The person who wrote most of the code of Turbo Pascal is Anders Hejlsberg. He's well known and he works for Borland. Actually, in the early days, Niels had a computer store in Copenhagen and Niels and I met because I was involved doing development and expansion for a small computer company in the US which was called OSM at that time. I met Niels because he was selling our computers in Denmark.

**EVERS:** Then there's virtually no substance to it?

**KAHN:** I'll continue. I mean you want a story because indeed there's a story about Borland but it wasn't in the Netherlands but it was in Ireland. It turns out that Niels had, and two of his partners, one called Ole Rasmussen at that time, he changed his name since. And the other one called Mogens Glad who is with Borland still. Those were the three original Danish guys. They had written a product called Menu Master for CP/M which was a small kind of a batch language thing for CP/M. And at the time when he was distributing our computers in Denmark.

Actually it's nice because I've heard that he's still talking about different things and you're the first one to get the story. I have never been asked about this before. Anyway, at the time what happened is that they had this product they wanted to sell in the states and I was involved with OSM and they asked me to take a look at it. We were selling a CP/M machine and I decided to take it on our computer and put it on every machine we sold. And we talked about how they could sell their product. The name of Niels' computer store was called Midas. And what we did is I told him to set up a company in Ireland, which he did. And what they did was they had a lawyer in Copenhagen, and that's a very funny part, that actually called Ireland and set up a company. And if you set up a company in Ireland, Ireland has a tax free zone. They have off the shelf companies you can get. And there was one called Alpha One, Alpha Two, Alpha Three. And when they called us up there was one called Boland. Or so they thought. And indeed, Niels did start a company that he thought was called Boland. His first letterhead was Boland for his company. It turns out that they started selling by putting this little ad for this Menu Master product in American magazines. And they started selling this product in the US.

And two things happened. First that company went out of business. So they filed a chapter seven. They ran out of money. And secondly, his own company in Denmark got into a lot of financial trouble. Being in the US, I did agree to help him with his product actually. But I was doing other things at that time. I was doing some consulting, building some things. And it is then that, having myself



studied with Niklaus Wirth and people like that, I had in mind to create a decent Pascal compiler. At that time there was a company called GRT Pascal selling a low-cost compiler, and there was MicroSoft and IBM selling a high-end compiler. And we were trying to build one. And one thing I asked Niels is to go and take a look, because there was a product at that time written by Anders Hejlsberg that was called PolyPascal.

The key role that Niels had, and that is absolutely clear, in what was to happen in Borland, which wasn't incorporated yet. We actually incorporated in May '85 in the US. And one of the things I did was use the name of the old Irish company, and that's because I couldn't find a better name at the time. I did indeed use that name. And what happened is I asked Niels to go and make a deal with Anders that we build, on the backbone of the original Poly Pascal, a Pascal compiler that would be slightly different. And Niels' contribution at that point was that he actually did go and negotiate the deal with Anders Hejlsberg. Unfortunately the deal was negotiated in such a way that Anders would stay out of Niels' operation in Denmark. What happened is that basically Niels was the glue between Anders and I and he made the introduction and signed the first contract and the first agreement between us. That is what happened.

Mogens Glad, who was part of that group of three, actually wrote the editor and the monitor, effectively the user interface to that compiler. Both Mogens and Anders work with Borland and they're here in Scotts Valley. So they haven't left with Niels' group. Now with regard to how we spun out the company, it turns out that Niels wanted to do development of products and several things happened. First he set up a development group in Copenhagen. And I did set up a development group in the US. Niels decided that he had to move to the United Kingdom because there's a taxation agreement Denmark and the UK somehow. And when he did that he actually left the group in Denmark of programmers with the manager and couldn't really travel back. And that's how he ended up in the UK.

In the UK he hired a few UK programmers to build some compilers. Niels and I had big discussions because we were starting to build compilers here and build quite a bit of software. And one of the issues was that he absolutely wanted to build a Modula compiler. I personally didn't want to because Anders was associated with a company that was building Pascal and didn't believe Modula was the future but C was. So I think we had a big argument and, in order to build a decent C compiler, we actually went and talked to the person who had written the best C

compiler yet that we could find. They were the people at Wizard and we actually convinced them to join the company. Brad Silverberg, who was VP Engineering at Wizard and now Borland, and our people worked on making Turbo C. It's at that point that Niels had some work going in compilers and we agreed to sell him that technology. So Niels paid about \$1.7 million to buy the work they had been doing for the company in the UK and we actually sold it to him. And that work is actually JPI Modula. We sold him the technology we had been working on because we decided to go a different route.

Basically it's fairly simple. Niels had his ideas. He did things differently. The guy who wrote the core of Turbo Pascal, Anders Hejlsberg, is still a Borland person. And Niels has built some compilers and we sold him that technology. The transaction is part of public documents. You can find out in FCC records. It's a fairly simple picture. I don't know if it conflicts with what Niels tells.

**EVERS:** Obviously it does a little bit. What I stated to you initially is what he had been stating.

**KAHN:** I like Niels a lot but you know, it's like everybody else. It's like Apple, I guess, Apple has 25 founders if you go and talk about it in Silicon Valley.

**EVERS:** Why don't we split from that. I really appreciate the reply.





## An Interview With Philippe Kahn

**KAHN:** Funny, no one ever asked the question that way so it's the first time I tell things. There's really nothing to it. It's pretty much what people imagine. There's no secret to it by the way. There's a lot of people who know that story. Now if you wonder what happened to the different people, the only person who's unaccounted for is the guy who was called Ole Rasmussen at that time, who was a photographer. And Ole actually changed his name to Ole Hendrixson, moved to the UK at the same time as Niels did, and retired. And Ole is retired and doesn't work and travels and has a good life.

**EVERS:** It must be nice. I could learn to appreciate that. Let's step up to the next question. When microcomputers first came into use back in the late seventies, most users were technically oriented. Since that time, hardware has appeared to evolve logarithmically, with software techniques & philosophies lagging a short distance behind. When do you feel that this hardware curve will level out, and what will we be working with at that point?

**KAHN:** It's not going to stop. Hardware is consistently going to stay ahead of software. It's a fact of life in the way that it takes much less time to design a new board than it takes to design software. And so I don't think it can stop that. One of the reasons is the chip companies have a vested interest in coming out with a new generation of chips to sell to create hype, and, justifiably so, that's how computing power evolves. And what happens is that chip companies are committed to an upwards compatible architecture meaning that every chip, although it has more capabilities, can be used in a downward compatible mode which lets software that was written for the previous chip run on the new chip and therefore that's how we alleviate the fact that we're not catching up completely, but of course we don't take full advantage of the new processors. It's not going to get better because it's just a fact of life. Software just takes more time than hardware.

**EVERS:** I've been writing software for years and I know very well that it takes years before you can actually develop anything properly on the hardware. The 68000 came out back in 1981 wasn't it, and it took people years before they knew anything about it. Let's go on to the next one. The computer users who are now in a majority position are non-technical. What are your views on the eventual plateau in hardware evolution causing software

developers to write themselves into redundancy? Well, you said that there is not going to be an eventual plateau in hardware evolution. There must be some sort of flattening on the curve.

**KAHN:** It's always like anything else. Right now doubling the speed of processors is a bigger effort than it was five years ago. Maybe I understand two questions in your question. One, your talking about the majority are non-technical users. I think one of the characteristics of this industry, which actually helped us build Borland with Turbo Pascal, but also is a characteristic, the industry started with people who were programming on their kitchen sinks. And because they were programming on their kitchen sinks, what happened was that people think that is the way computing has to be forever. But, no offense, what we have to say is, well, in order to go to the next wave of users, we're always talking to a given circle of users, to triple the size of the user base, we've got to make the computing metaphor that's used on work stations a little better. Which means that getting machines to work more the way people work rather than have them have to change the way they work in order for them to use the work station. And, clearly, when you say that software developers would write themselves into redundancy, my perception is that, did you mean that people will write so much great software that you won't need people writing software any more, right?

**EVERS:** That's basically it. If packages are refined to a higher level, just like Paradox is a relational database that's getting close to the leading edge, then there's only so many things that still can be written for the mass market. Eventually it will get to a point where custom applications, or severely vertical-market applications, are the only things really left to be written.

**KAHN:** I don't think so and I understand your point. I think that there is always going to be the room to do it better and to do it slightly differently. I don't believe in non-evolution. I think that this industry is made totally of evolution and it's going to continue. To me there's no way that you're going to see this thing stalling. And people say, "well now I've got the ultimate spreadsheet, and the only thing I can do now is a doctor's office package." I think it's the kind of question you get like, "well, you know, it's not possible to start a new software company nowadays." When I started with Borland, I have to say that I heard the same song,

you know, you couldn't do it and can't do it. That's true if you're lacking something different.

**EVERS:** I don't necessarily agree with pure redundancy. I don't know where the future's going to lie. Right now the biggest buzz word is Executive Information Systems in many ways. And I'm the author of one of them, for God's sake. So that's a brand new area that's opening up.

**KAHN:** Which one did you write?

**EVERS:** It's called Executive Presenter. It was just shown in California recently. And that's an area that just breaking open right now but there's going to be new areas over the years as new people invent new things they want to do with their machines. So, who knows. We'll find out in a few years if everything's been done or if people are imaginative enough to create new areas for applications.

**KAHN:** With the new metaphors that include some direct manipulation of objects and things like that, new ways to do old things are surfacing. There's no question of that.

**EVERS:** Let's go on to the next one. According to your promotional literature, your Turbo Prolog implementation is "the premier artificial intelligence software development program for IBM PCs and compatibles." It's kind of redundant of the last. Do you believe that software developers will one day become obsolete after creating AI applications that can effectively spawn their own applications?

**KAHN:** No. I don't believe in magic application generators. I don't believe in, you press a button. It's basically, the God of software will not be created. What I mean, the God of software, the thing that you start and creates every possible application that you'll ever need. I just don't. I don't believe in applications generators to a large extent. They're useful, just another tool. I really don't believe that's the case. Artificial intelligence is a word that sometimes has been over used. Those are interesting techniques and important techniques that every software engineer should have in his arsenal of techniques. But it's certainly not the ultimate, final, last wave.

*Next issue, we'll be publishing the final installment of this interview. In it, Philippe discusses Electronic Mail, Competition in the Marketplace, Operating Systems, Why Basic Should Be Shot, Object Oriented Languages, Borland's Plans For Education, Economics and much more.*



## Autoranging Multimeter



KB Electronics announces the addition of the HC 775 Auto Ranging Digital Multimeter to its line. It features five DC voltage ranges to 1000V, four AC ranges to 750V AC/DC current to 10A, resistance, continuity and a low battery indicator. Voltage accuracies are 0.5% DC and 0.75% AC. 1428 Speers Road, Unit 8, Oakville, Ontario L6L 5M1, (416) 847-8588, Fax 847-8598.

Insert RSC Number

## High Precision Counter

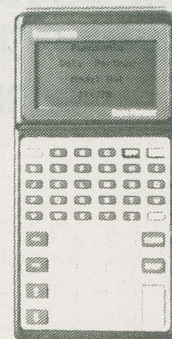
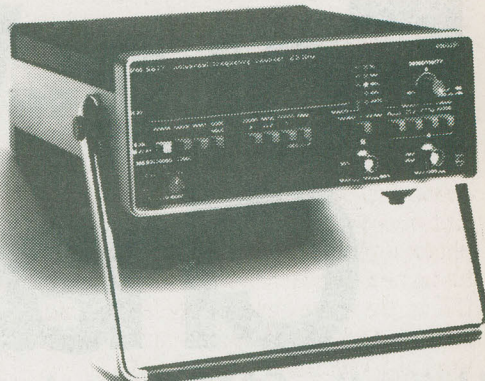
The new PM 6677 counter has a frequency range of 2.3GHz for use in high-performance telecom applications, at a price under \$2,900. It features a choice of five high-stability timebases and a reciprocal counting technique that ensures high resolution even on low-frequency signals. An external reference input allows the use of in-house frequency standards. Fluke Electronics Canada Inc., 400 Britannia Road, Unit #1, Mississauga, Ontario L4Z 1X9, (416) 890-7600, Fax 890-6866.

Insert RSC Number

## Bar Code Computer

The Panasonic JT-770 Data Partner and scanner is a bar code reader and data collector for quick access to inventory applications from production line to warehouse to service locations. The CMOS 16-bit 8088 processor processes data at high speeds and stores it in the standard 256K memory (expandable to 960K). Panasonic Industrial Products Group, Matsushita Electric of Canada Ltd., 5770 Ambler Drive, Mississauga, Ontario L4W 2T3, (416) 624-5010.

Insert RSC Number

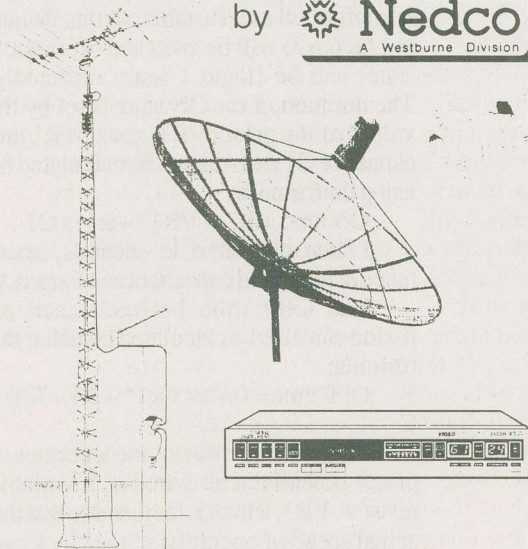


*Continued on page 38*

## Satellite TV Supplies

### ANTENNA, TOWER & SATELLITE SYSTEMS

by  **Nedco**  
A Westburne Division



Looking for satellite TV dishes, towers or complete systems? The Nedco catalogue features a wealth of antennas, receivers, actuators, amplifiers, switches, connectors, cables, hardware and more. It also includes standard antennas, TV sets and related cabinetry. There are dealers all across Ontario, with outlets in Moncton, Trois Rivières and Yorkton, Sask. The head office is at 3455-14th Avenue, Markham, Ontario L3R 2L6, (416) 475-7602, Fax 475-0113.

E&TT November 1989

## METERS FOR EVERY JOB! VALUE PRICED

### MODEL GDM-8035 DIGITAL BENCH MULTIMETER

Six functions including AC/DC voltage, AC/DC current, resistance and diode test, 20A high current range and 1200V high voltage range, accuracy 0.1%. Circuit protected, seven segment LED display.

**\$325.** Plus \$10 for shipping & handling.



### MODEL HC-4510 4-1/2 DIGIT ACCURACY

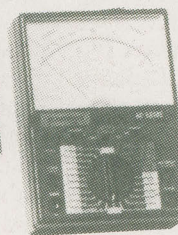
200mV to 750V AC, 200mV to 1000V DC and 2mA to 10A AC/DC currents plus resistance 20 ohm to 20M ohm. Overload protected, 9V battery included.

**\$134.50**

Carrying case: add \$10.00.  
Plus \$5 for shipping & handling.



HC-4510



HC-5050E

### HC-5050E DELUXE ANALOG MULTIMETER

14 DC volt ranges to 1200V and 13 AC ranges to 3300V plus AC/DC currents, DC resistance and dB. Accuracy 2.5% DC and 3.5% AC. Complete with carrying case.

**\$59.95**

Plus \$5 for shipping & handling.  
CSA approved where applicable.



Order by phone or mail. Credit card, money order, cert. cheque or C.O.D. Ontario residents add 8% P.S.T.

## KB ELECTRONICS

1428 Speers Rd., Oakville, ON L6L 5M1  
Tel. (416) 847-8588 FAX (416) 847-8598

Circle No. 19 on Reader Service Card



# Four-Way Chaser

Using the CMOS version of the 555 timer to produce a simple LED light chaser.

CHRIS BOWES

This project features a simple chaser circuit which can be easily redesigned to give a number of chase patterns for between two and ten output circuits. It is a truly digital project and should provide an interesting introduction to digital electronics for anyone who has been unsure about using such ICs in projects.

The major advantage of digital circuitry over other forms of circuitry is that it operates on only two voltage levels. These are the power supply (referred to as LOGIC 1) and 0 volts (referred to as LOGIC 0).

## Circuit Description

The full circuit diagram for the Four-Way Chaser is shown in fig. 1. In effect this circuit consists of two basic building blocks. These are the clock pulse generator, which is made up of preset VR1, resistors R1, R2, capacitor C1 and IC1. This is used to drive the chaser circuit which consists of IC2 and the output LEDs D1 to D4.

The clock uses a standard 555 timer circuit. However, in this project it is important that a CMOS 555 timer (such as the 7555) is used, because the cheaper, bipolar version is not suitable for circuits which also include digital elements. The CMOS ICM 7555 timer does not require the connection of the capacitor between 0 volts and pin 5 that you may have noticed in some circuits using the bipolar device.

To produce the clock pulses, the timer is configured as an astable, so that its output (at pin 3) will be switched off (logic 0 state) and on (logic 1 state) repeatedly. The duration of the ON state is set by the values of the preset VR1, resistor R1 and capacitor C1 and this can be calculated by using the formula:

$$\text{ON time} = 0.7 \times (\text{VR1}^* + \text{R1}) \times \text{C1}$$

[Time measured in seconds, resistance in ohms and capacitance in Farads.]

The OFF time between each on period can also be calculated by using the formula:

$$\text{OFF time} = 0.7 \times (\text{VR1}^* + \text{R1} + \text{R2}) \times \text{C1}$$

C

The circuit shown incorporates a preset potentiometer wired as a variable resistor, VR1, which is included so that the actual speed of operation of the clock can be adjusted as desired by adjusting the wiper of VR1. Only the part of the resistance which is actually incorporated into the circuit is included in the two timing formulae given above.

## Chaser Circuit

The chaser circuit consists, very simply, of

E&TT November 1989



a 4017 Johnson Counter which is used to turn on the output LEDs D1 to D4 in sequence. The 4017 has two clock inputs (at pins 13 and 14). These operate with opposite sense inputs and for the purposes of this circuit the clock pulse from pin 3 of IC1 is connected to pin 14 of IC2 with pin 13 of IC2 held at the logic 0 level by being connected to the 0 volts power supply rail.

In this arrangement each pulse from the output of IC1 causes the outputs of IC2 to go to the logic 1 state in sequence. As we only require four LEDs to be driven by this circuit only outputs 0 (pin 3), 1 (pin 2), 2 (pin 4), and 3 (pin 7) are used to drive the LEDs. The fifth output to be energized in sequence (4 — pin 10) is connected to the Master Reset input (pin 15). The effect of this is that whenever output four (pin 10) goes to the logic 1 state this immediately triggers the Master Reset circuit within IC2 which in turn resets the counter to zero with output 0 once more in the logic 1 state.

Each of the outputs 0 to 3 is connected to an LED, via a 330 ohm series resistor (R3-R6). These resistors are necessary to restrict the current flowing through the LED to a safe level to prevent them burning out.

Capacitor C2 is included in the circuit to provide the decoupling necessary to prevent the rapid switching which occurs

within the ICs from scrambling the sequence generated by IC2.

## Construction

The Four-Way Chaser is easily made up using stripboard. The finished board is shown in the photographs and the component layout in Fig. 2 so you will probably find it helpful to look at those while you make up the circuit.

The first task is to cut a piece of stripboard to the correct size. You will need a piece which is at least 14 strips deep and 46 holes wide. You will need to drill the mounting holes as shown, using a 4mm drill, before starting to construct the circuit.

Before any components are mounted on the stripboard you will need to break the copper tracks as shown in Fig. 2 with a stripboard cutter or a small drill. It is important that these track breaks are made completely so that not even the merest sliver of copper remains to bridge across the track break.

Once the board has been prepared you can start the electronic construction. Although the operation of the circuit is not affected by the order in which you insert the components into the stripboard, you will find it easier to construct the circuit if the components are inserted in ascending order of size.

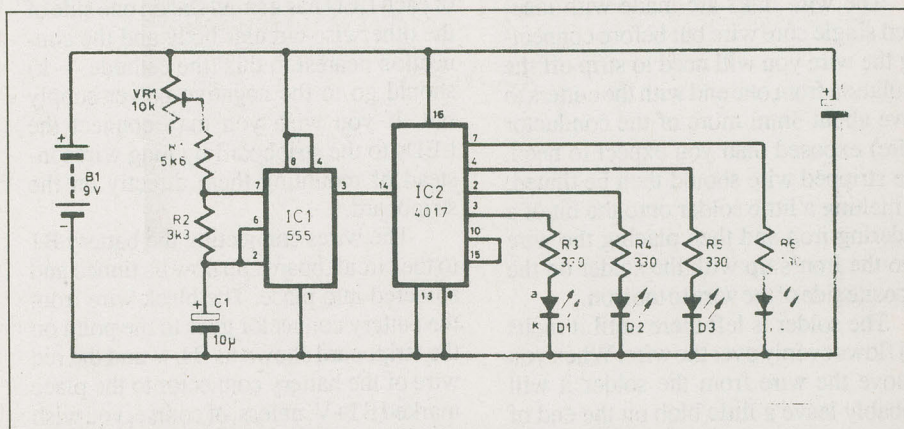


Fig. 1. The circuit diagram of the Four-Way Light Chaser.

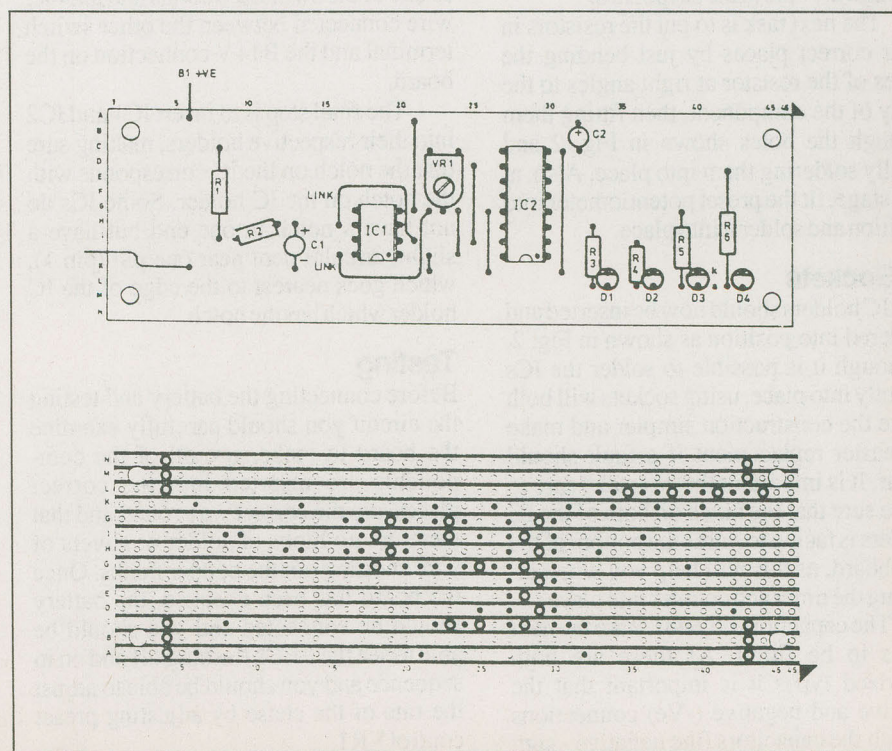


Fig. 2. Stripboard component layout and details of breaks required in the underside copper strips. The ICs should be in sockets.

## PARTS LIST

### Resistors

R1 ..... 5k6  
R2 ..... 3k3  
R3-R6 ..... 330  
All 0.25W 5% carbon

### Potentiometer

VR1 10k min. horizontal trim

### Capacitors

C1 ..... 10u elec. 10V  
C2 ..... 2u2 tantalum 10V

### Semiconductors

D1-D4 ..... LED  
IC1 ..... ICM7555 CMOS timer  
IC2 ..... 4107 CMOS Johnson counter

### Miscellaneous

B1 ..... 9V battery  
S1 ..... SPST toggle switch (optional)

Stripboard, 0.1in matrix 14 strips x 46 holes; case (optional); i.e.d. clips (optional); battery clips; connecting wire; solder, etc.



# Project Special

## Link Wires

The first stage in constructing this circuit should be to insert the wire links into place. To do this you should place the stripboard so that the strips of copper on it are underneath the board and run from left to right and not up and down.

Starting at the top left hand corner of the board count across and then down the correct number of holes until you can place one end of the wire link in the position shown in Fig. 2. Turn the board over and solder the wire into place. Cut off any excess wire on the underside of the board with your cutters and turn the board over again for the other end of the link wire.

The wire links are made with insulated single core wire but before connecting the wire you will need to strip off the insulation from one end with the cutters to leave about 3mm more of the conductor (wire) exposed than you expect to need. The stripped wire should then be tinned, by melting a little solder onto the bit of a soldering iron and then placing the wire onto the iron's tip with the solder on the opposite side of the wire to the iron.

The solder is left there until it melts and flows evenly over the wire. When you remove the wire from the solder it will probably leave a little blob on the end of the wire, which you should then cut off. The tinned wire should now fit easily through the hole in the stripboard.

The next task is to put the resistors in their correct places by just bending the wires of the resistor at right angles to the body of the component, then fitting them through the holes shown in Fig. 2 and finally soldering them into place. Also, at this stage, fit the preset potentiometer into position and solder it into place.

## IC Sockets

The IC holders should now be inserted and soldered into position as shown in Fig. 2. Although it is possible to solder the ICs directly into place, using sockets will both make the construction simpler and make for easier replacement if a fault should occur. It is important that you take care to make sure that the notch on both of the IC holders is facing towards the bottom of the stripboard, as this will help you when inserting the timer and counter into place.

The capacitors C1 and C2 are the next items to be fitted. As these are both polarized types it is important that the positive and negative (-Ve) connections of both the capacitors (the negative - sign is usually marked on the component case) are connected to the correct holes marked

in Fig. 2. Failure to mount these components correctly will, at least, cause the risk of the circuit not working.

Both of the capacitors are easy to mount because they have leads which push into the board without needing to be bent. But, because the capacitor's connections are so close together, it is important that you take great care with the process of counting the holes when looking for the correct place to install these components.

The final components to be mounted are the LEDs D1 to D4. These devices are also polarized but the result of not connecting them the correct way round is simply for the circuit not to work. The case of each LED has a small flat on one side of the otherwise circular body and the connection nearest to this (the cathode — k) should go to the negative power supply rail. If you wish you may connect the LEDs to the stripboard by long wires instead of mounting them directly on the stripboard.

The wires connecting the battery B1 to the circuit board can now be tinned and soldered into place. The black wire from the battery connector goes to the point on the stripboard shown as B1-V and the red wire of the battery connector to the place marked B1+V, unless, of course, you wish to add an on/off switch. In which case the battery connector red wire will need to go to one of the switch terminals and another wire connected between the other switch terminal and the B1+V connection on the board.

The final step is to insert IC1 and IC2 into their respective holders, making sure that the notch on the IC corresponds with the notch on the IC holder. Some ICs do not have a notch in one end but have a slight, circular dent near one pin (pin 1), which goes nearest to the edge of the IC holder which has the notch.

## Testing

Before connecting the battery and testing the circuit you should carefully examine the board to make sure all of the components are inserted into the correct places, are the correct way round and that there are no blobs of solder or slivers of wire shorting out the copper tracks. Once the board has been checked, the battery should be connected and you should be able to see the LEDs flashing off and on in sequence and you should be able to adjust the rate of the chase by adjusting preset control VR1.

If the circuit does not operate correctly it will be necessary to check for faults.

The first step in fault finding is to check carefully, once more, that all of the components are in the correct places and are the correct way round. In this project the components likely to cause faults if connected the wrong way round are the LEDs, C1, C2 and IC1 and IC2.

The next stage is to check carefully that all of the soldered joints are good joints. This is probably best done by reheating the joint with a soldering iron.

If no mechanical problems of the sort mentioned above are found then it will be necessary to check the circuit through to see whether there is a faulty component or not. You will probably find that you will need to use a multimeter to perform this stage of the process.

## Fault Finding

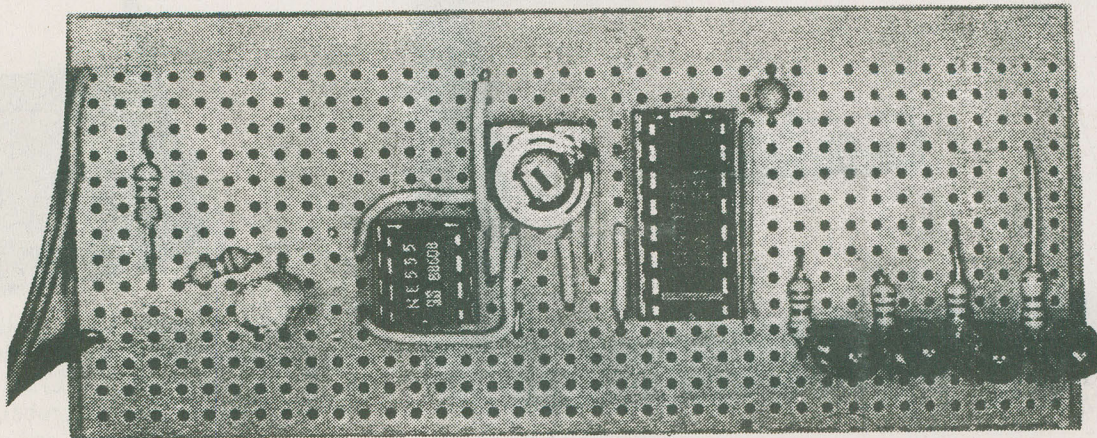
When fault finding it is important to adopt a logical approach to the problem, the first step being to look at the symptoms presented by the circuit and decide which is the most likely part of the circuit to produce the fault. The circuit description above will help you here.

The logical place to start is by checking that there is an output from the clock circuit. To check this simply place the multimeter so that the positive probe is connected to pin 3 of IC1 and the negative probe of the meter is connected to any 0V connection, such as pin 1 of IC1. If the clock circuit is operating correctly you should see the meter needle swing rapidly back and forth. If this is not happening you should investigate further by testing the voltages present at various points in the circuit.

Firstly you should measure the battery voltage with the battery disconnected from the circuit and then between any 0V connection and both pins eight and four of IC1 as well as between the battery positive connection to the board and pin 1. If there are no voltages present when a good battery is connected to the board this will obviously indicate faulty wiring up of the board.

If the output voltage at pin three is locked permanently at a fixed voltage then you should remove IC1 from its socket and check the voltage at the pin three connection again. If the voltage persists with the IC removed then the fault does not lie with IC1 but most possibly with the wiring associated with the input to IC2. Similarly a permanent 0V at pin three of IC1 might be caused by a short between pins 13 and 14 of IC2 or the 0V connection to pin 13 having been inadvertently connected to pin 14.





*Layout of components on the completed prototype board. Note that the timer i.c. is not the required CMOS version.*

The next stage is to replace IC1 in its holder and check the voltages between 0V and pin two, pin six and pin seven. The voltage at pin seven should be fluctuating around a value which is roughly 2/3rds of the battery voltage. The voltages at pins two and six should be identical (because these two pins are connected together by a wire link) and these should also be fluctuating but at a voltage slightly less than that found at pin seven.

If both of these voltages are not present then the most likely cause is that the circuit from the positive voltage rail, through preset VR1 and resistors R1 and R2 is not correctly made. This is best checked by measuring the voltage present between 0V and each of the points in the component chain through VR1, R1, R2 and capacitor C1 and investigating at the point where no voltage is measured.

If a voltage is present between 0V and pin seven but no voltage, or only a very small voltage, is measured between the 0V rail and pins two or six of IC1, then you should check that the resistance between pins seven and six of IC1 is roughly equal to that of resistor R2. If this is correct then check the resistance of capacitor C1 with the resistance range of your meter.

If the resistance is very low (less than about 500 ohms) then you should replace capacitor C1. If there is no voltage measurable between pins six and two of IC1 then this could be caused by a short circuit between the connections of C1 or by a short circuit within C1 or its connections to the stripboard.

E&TT November 1989

If voltage is present at pins two and six of IC1 but it does not fluctuate then the likely causes are that the capacitor C1 is not correctly connected — which can be checked by reheating the joints of C1 on the stripboard — is faulty, or that IC1 is faulty. To check C1 you should touch connect another capacitor of similar value across the connections to see if this cures the fault. If this does not cure the fault then you should check that the connection between the positive connection of C1 and pins two and six of IC1 is correctly made.

### Chaser Circuit

If voltage switching is occurring at pin three of IC1 then the clock circuit is working correctly and the fault must lie within the chaser circuit. Again a few voltage checks need to be made to help with the diagnosis of any chaser circuit faults.

Check that the signal from pin three of IC1 is repeated at pin 14 of IC2. There should be no wiring problem here as the connection is made by a direct copper strip.

If the signal is not reaching pin 14 of IC2 then the only real explanation is that there is a poor soldered joint either at the connection of the strip to pin three of IC1 or to pin 14 of IC2.

The next step is to check that the battery voltage is measurable between pins eight and 16 of IC2. If this is not measurable then the connections between the power supply rails and the IC should be investigated.

The battery voltage should be measurable when the positive meter probe

is connected to pin 16 and the negative probe is connected to pin 13. If this does not occur the connection between the 0V power supply rail and pin 13 should be investigated.

The final input to be investigated is pin 15. This pin (and pin 10) should be at logic 0 (0V) for virtually the whole of the time. The very brief time for which these two pins are at logic 1, which occurs at the reset point, is so small as to be almost unmeasurable. If the voltage readings at pin 10 and pin 15 are not the same then the connecting link should be checked.

If the above tests reveal nothing untoward the final step is to check the outputs. If all of the other connections to IC1 are correct the outputs 0 to 3 must either be switching from Logic 0 to Logic 1 in sequence or the IC is faulty.

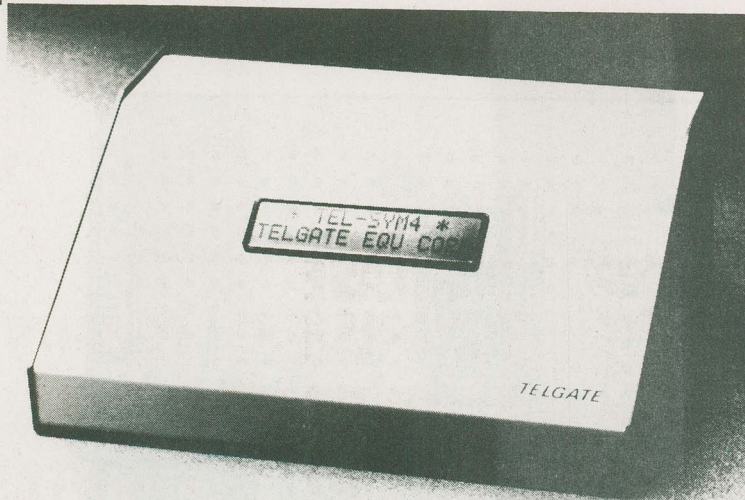
Whenever any of the outputs goes to the logic 1 state its associated LED (D1 to D4) should light. If this does not happen then the connections between the appropriate output pin and LED should be investigated. The most likely cause of this problem is that the LED is inserted into the board with the polarity reversed or that there is at least one dry joint in the series of connections from IC2 outputs, through the dropping resistor and LED to the 0V line.

### In Use

The project is simple to use. Once you have checked that it works correctly, you can simply set VR1 to give the correct speed of operation and place the LEDs in the desired position.



## Telephone Line Simulator



The Tel-Sim4 simulates four telephone lines, with features such as Off Hook Detect, Dial Tone, DTMF Ringing, Ring Generation, Busy Signal and more. An LCD gives a visual indication of com-

munications status. Also available in one- and two-line versions. Telgate Equipment Corporation, 635 Gardena Way, Coquitlam, BC V3J 3W4, (604) 936-3819.

Circle No. 20 on Reader Service Card

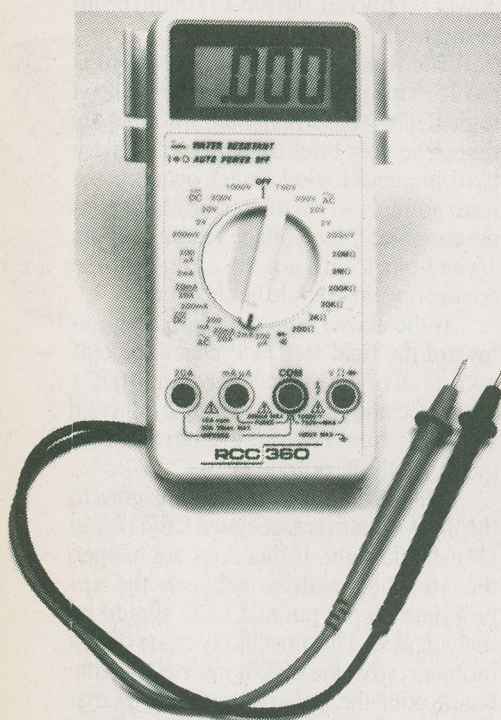
## Multifunction Multimeter



The Kyoritsu Model 1601 is a rugged analog multimeter, featuring water-resistant construction, AC/DC volts to 10kV (with optional HV probe), 20A AC/DC, and complete fuse and overload relay protection. Ideal for bench or portable use. Omnitronix Ltd., 2410 Dunwin drive, Unit 4, Mississauga, Ontario L5L 1J9, (416) 828-6221, Fax 828-6408.

Circle No. 21 on Reader Service Card

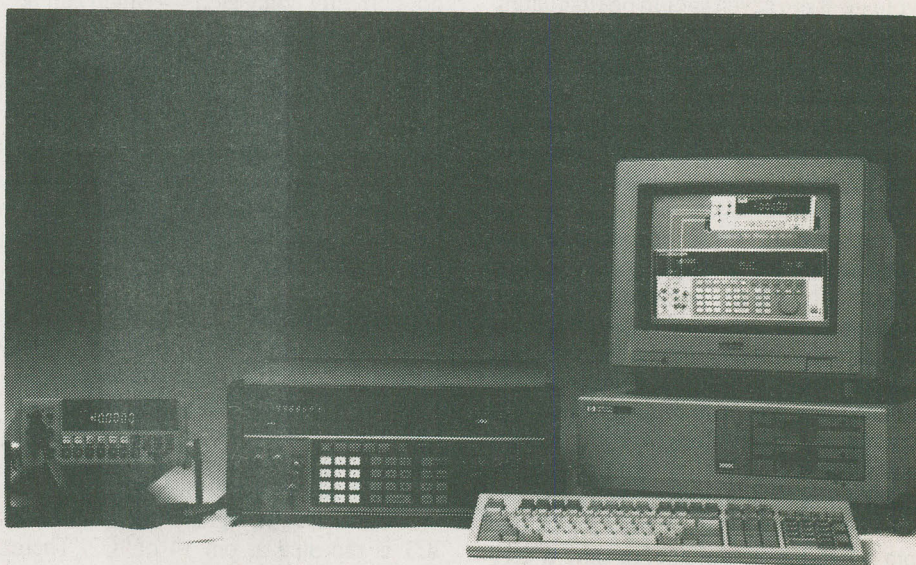
## New Digital Multimeter



The RCC 360 digital multimeter is water-resistant and drop-proof, and features DC voltages to 100V, AC voltages to 750, AC/DC current to 20A, resistance ranges and a diode test. The sampling rate is 2.5 times per second. RCC Electronics, 310 Judson St., Unit 19, Toronto, Ontario M8Z 5T6, (416) 252-5094, Fax 252-3031.

Circle No. 22 on Reader Service Card

## PC Calibration Software



New MET/CAL automated calibration software from Fluke allows the use of a PC for calibrating test equipment. It provides performance previously available only with a dedicated IEEE-488 instrument controller. The operator simply selects a code, which will then automatically handle all

parameters of instrument control and testing. Fluke Electronics, 400 Britannia Road E, Unit #1, Mississauga, Ontario L4Z 1X9, (416) 890-7600, Fax 890-6866.

Circle No. 23 on Reader Service Card



# PIN

# IT

# DOWN!

- INCREASE FUND-RAISING PROFITS!
- BUILD TEAM SPIRIT!
- RECOGNIZE VOLUNTEERS!
- REWARD YOUR EMPLOYEES!
- GET YOUR COMPANY NAME AROUND!

At The Pin Factory, we can help you pin down your business with our custom lapel pins, charms, key chains, souvenir spoons, belt buckles, money clips and other pressed metal products, manufactured with the newest production equipment available.

We can help you create your own special "one-of-a-kind" item. Special die cutting will give your item a custom shape, in virtually any colour of the rainbow. Choose from our wide range of production materials, including precious and semi-precious metals.

We give competitive pricing, quality products and efficient, courteous service on all your orders, large or small! So call us today and let us show you how we can help you pin it down!

## THE PIN FACTORY

9752 — 47 Avenue, Edmonton, Alberta T6E 5P3  
Phone: (403) 435-5944 FAX: (403) 437-4105



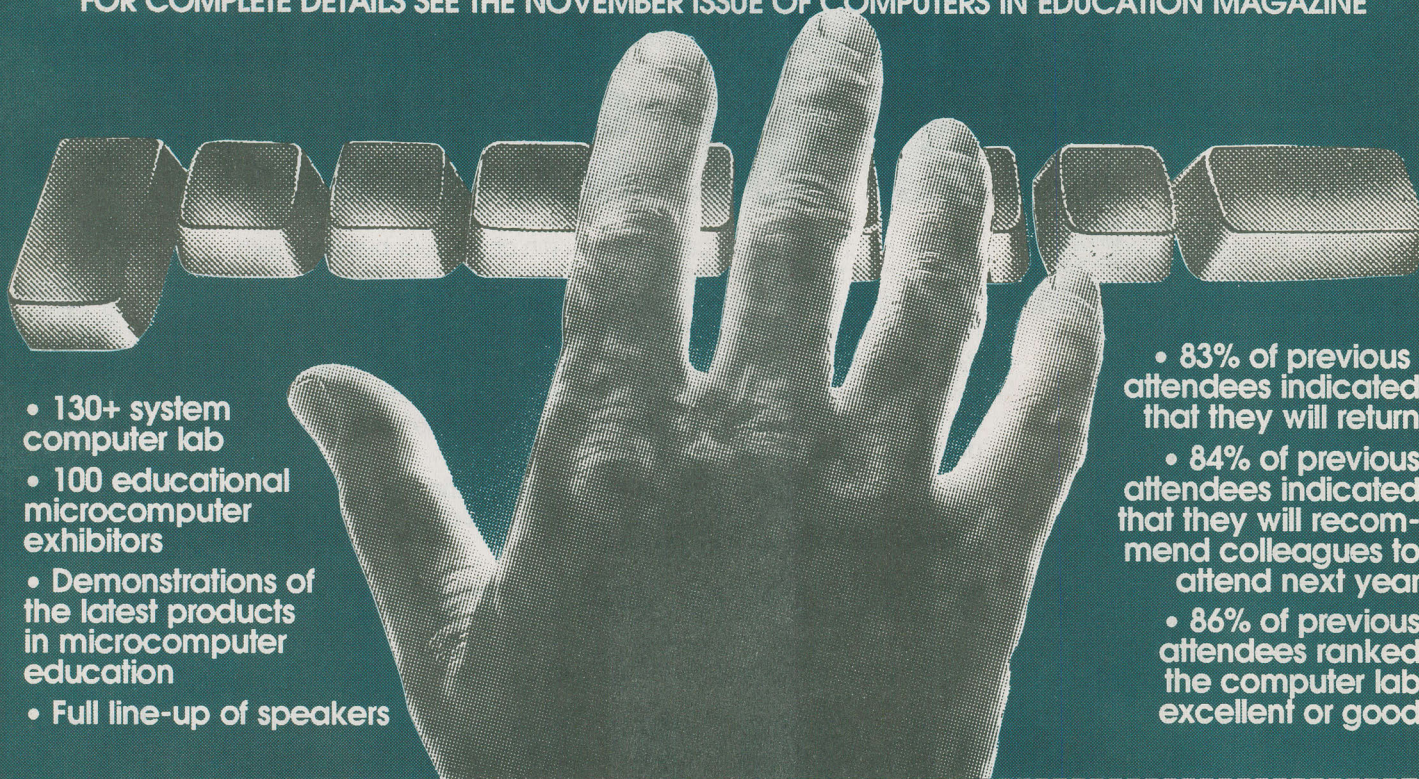


# Computers in EDUCATION 90

FOR  
EXHIBITOR  
INFORMATION  
CONTACT THOMAS SOCKETT  
274-5505

## HANDS-ON SHOW AND CONFERENCE FEBRUARY 1 & 2, 1990

FOR COMPLETE DETAILS SEE THE NOVEMBER ISSUE OF COMPUTERS IN EDUCATION MAGAZINE



- 130+ system computer lab
- 100 educational microcomputer exhibitors
- Demonstrations of the latest products in microcomputer education
- Full line-up of speakers

- 83% of previous attendees indicated that they will return
- 84% of previous attendees indicated that they will recommend colleagues to attend next year
- 86% of previous attendees ranked the computer lab excellent or good

### FOR INFORMATION COMPLETE AND RETURN TO:

Attention: Thomas Sockett, Computers in Education '90  
1599 Hurontario Street, Suite 301, Mississauga, Ontario, L5G 3H7

YES I'M INTERESTED IN EXHIBITING ☐ YES I'M INTERESTED IN ATTENDING ☐

Surname \_\_\_\_\_ First Name \_\_\_\_\_

Title \_\_\_\_\_

Institution/Company \_\_\_\_\_

Address \_\_\_\_\_ City \_\_\_\_\_

Prov./State \_\_\_\_\_ Postal Code/Zip \_\_\_\_\_ Telephone ( ) \_\_\_\_\_

FOR  
COMPLETE  
INFORMATION  
PHONE  
(416) 274-5505  
OR FAX  
(416) 274-0060

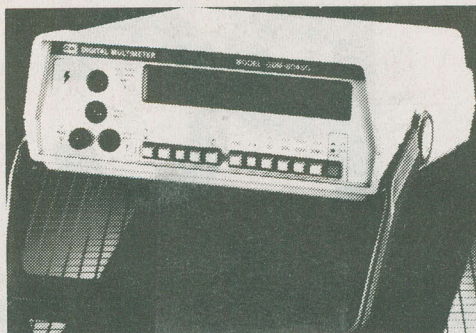
COMPUTERS IN EDUCATION '90 IS JOINTLY SPONSORED BY  
COMPUTERS IN EDUCATION MAGAZINE, KENNETH MARSKELL PUBLISHER,  
AND ECM EXHIBITION & CONFERENCE MANAGEMENT LTD. PAUL DAY PRESIDENT.



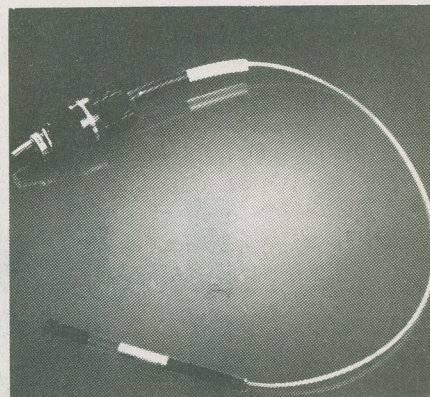
### True RMS DMM

Goodwill Instruments offers the GDM8045G bench-type digital multimeter, featuring true RMS measurement, a 4 1/2 digit LED display, a 20A current range and 1200V voltage range. Also included is a diode tester and resistance ranges. Accuracy is 0.3% typical. Duncan Instruments Canada Ltd., 121 Milvan drive, Toronto, Ontario M9L 1Z8, (416) 742-4448.

Circle No. 24 on Reader Service Card



### Fibre Optic Line



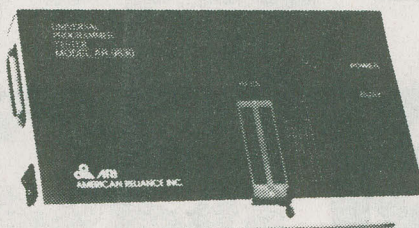
Protective splice covers for aerial applications and preterminated pigtail cable assemblies have been added to the "Dorran" line of reusable, mechanical fibre optic cable splices from 3M. The preterminated pigtail assembly and mechanical splice eliminate difficult fusion splicing. 3M Canada Inc., Electronic Products, PO Box 5757, London, Ontario N6A 4T1, (519) 451-2500.

Circle No. 27 on Reader Service Card

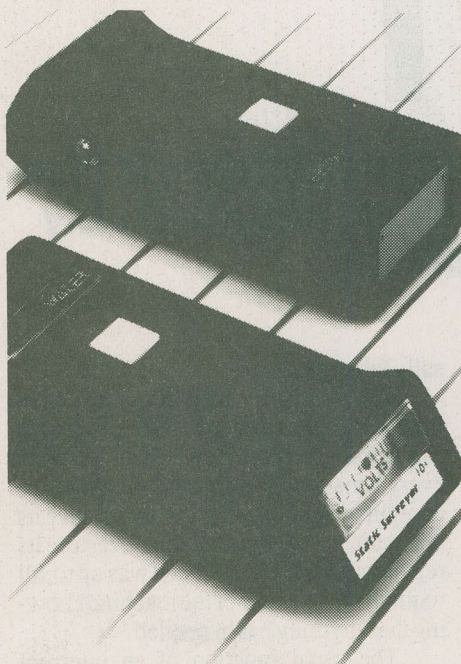
### Programmer-Tester

The AR-9830 Universal Programmer-Tester from American Reliance is designed to work in conjunction with a PC or compatible computer, and provides programming of E and EE PROMs, bipolar PROMs, PLDs, and 8748/8751 micro-controllers. It also functions as an IC tester that checks most TTL and CMOS ICs and DRAMs. BCS Electronics, 680 Alness St., Unit 7, Downsview, Ontario M3J 2S2, (416) 661-5585.

Circle No. 25 on Reader Service Card



### Portable Static Meter



The Charleswater Static Surveyor features non-corroding gold sensors and an easy-to-read analog display. Charges over 500V are read by holding the device within 2" and pressing a button. The unit is powered by a rechargeable battery and has an accuracy within 20%. Charleswater Products Inc., 93 Border St., West Newton, MA 02165, (617) 964-8370, Fax (617) 964-0172.

Circle No. 26 on Reader Service Card

## Value Priced Oscilloscopes

### 20 MHz DUAL TRACE

#### OUR MOST POPULAR SCOPE!

Features built-in component tester ideal for troubleshooting solid state circuits and components with no circuit power; 80 x 100 mm high luminence CRT; TV sync measurement for vertical and horizontal circuitry. Sensitivity 1mV/div. Dimensions: 6.4"x11.5"x14".  
MODEL NO. 33330 **\$595.**

### 15 MHz PORTABLE

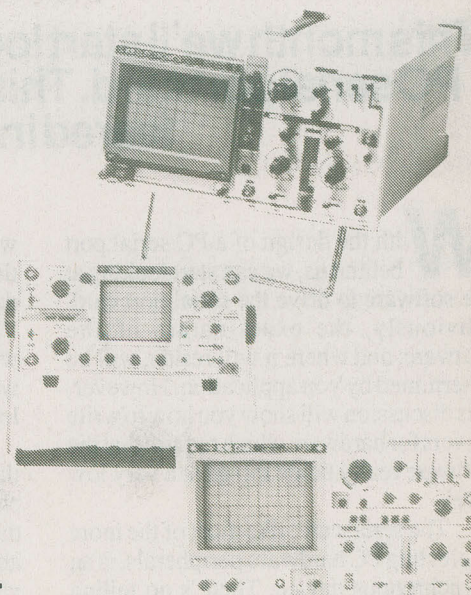
Dual trace, rechargeable battery or AC operation, 3.5" CRT, TV video sync filter, sensitivity 2mV/div., carry handle.  
MODEL NO. OS615S **\$829.**

### 35 MHz DUAL TRACE

Features fast sweep time, high brightness 80 x 100 mm CRT display, stable display of Ch.A and Ch.B waveforms, single trace viewing, sensitivity 1mV/div.  
MODEL NO. OS635 **\$849.**

Set of 1:1/10:1 switchable probes \$59.

50 MHz also available. Please add \$15 for shipping and handling.  
Order by phone or mail. Credit card, money order, cert. cheque or C.O.D.  
Ontario residents add 8% P.S.T.



## KB ELECTRONICS

1428 Speers Road, Oakville, Ontario L6L 5M1  
Tel: (416) 847-8588 • FAX: (416) 847-8598.

ASK FOR  
OUR FREE  
CATALOGUE  
TEST BENCH  
EQUIPMENT



Circle No. 28 on Reader Service Card



# PC Hardware Interfacing Part 11

**This month we'll start looking at the machine language driver for the PC serial port card. This will include the mysterious and justifiably feared interrupt handler mechanism.**

**STEVE RIMMER**

**W**ith the design of a PC serial port behind us, we can start looking at the software to drive the serial port card. Obviously, the exact nature of the software, and where it will reside, will be determined by you application. However, this discussion will show you how to write drivers for hardware which require that the software really tickle things at a very low level.

The serial card, like most of the more interesting PC hardware peripherals, is an asynchronous device. There's no telling when data will appear at it, nor how much of it is likely to turn up at a time. As such, we have to find sneaky ways to deal with its requirements of the computer.

## **Interrupts for Free**

As we have discussed, the serial port card can be dealt with in a number of simple

ways, most of them involving "polling" the status port of the card to see if there's data waiting in the input buffer. The phrase "input buffer" may be a bit misleading when it comes to the 8250, the buffer which the chip provides is only one byte long, which isn't much of a data stash.

The problem with polling the port is that the program doing the polling has to check the port at least as frequently as the data is likely to come in, and it has to be able to handle any data it finds in the interval between two incoming characters, or data will be lost and the information being transmitted over the serial port will be seriously mangled. On a good day this simply means typing up your whole computer is a largely mindless task. On a bad day it doesn't work at all—if the baud rate is high enough or the data handling process complex enough, polling univer-

sally falls apart.

This is why the 8250 provides for an interrupt driven strategy as well. The chip can be programmed to throw an interrupt every time a byte comes in, such that the computer can stop what it's doing, save its registers, get the byte, handle it, restore its registers and return to what it was up to, all without the operator of the machine knowing that anything has happened.

The usual function of an interrupt driven serial program is to store the incoming bytes in what is called a "circular queue". This may take a bit of explaining. While serial data frequently comes in at a rate which exceeds the ability of the host software to process it, it rarely does so for any length of time. For example, XMODEM style file transfers work by sending a block of data, say one hundred and twenty-eight bytes, and then waiting



for an acknowledgement from the other end of the conversation before sending another block. Even if the block itself comes down the wire very quickly, the receiving end will have a chance to process it — in this case, possibly to write the block out to a disk file, in the interval between acknowledgements.

The only difficult part is being able to stash the bytes somewhere until the pause. This is how the interrupt handler works. It maintains three things which it works with. These are the *data buffer*, the *head pointer* and the *tail pointer*. If you understand these you'll have a much better idea of how to successfully process asynchronous data from any external hardware device.

For what it's worth, the data from a PC's keyboard is handled in exactly this way.

The data buffer can be any length. Let's say that it's five hundred bytes long for the moment. This would not actually be a very good choice for most applications — the buffer size should be a multiple of the block size in which your data is likely to appear, but it will do for this example.

The head pointer and the tail pointer start by pointing to the start of the buffer. The buffer is said to be empty initially.

When a character comes in, it's placed where the head pointer points. The head pointer is then passed through an increment routine which increments it and then checks to see if it has exceeded the end of the buffer, which it will not have done, as there are still four hundred and ninety-nine bytes free. If it had exceeded the end of the buffer the increment routine would reset it to point to the beginning. After five hundred bytes, the next byte which comes along will automatically overwrite the first byte in the buffer.

The buffer thus behaves like a circular carousel as far as the data is concerned. As it's incremented, the head pointer always runs around the buffer.

At the same time as all this is happening, hopefully, there will be a foreground task which takes bytes out of the buffer. It does this in much the same way. It checks to see that the head pointer and the tail pointer do not point to the same location, a condition which would indicate that the buffer was empty. Assuming that this is not the case, the code which retrieves data fetches the byte currently pointed to by the tail pointer and then runs the tail pointer through the aforementioned increment routine.

As you can see, then, the tail pointer will chase the head pointer around the circular queue, the gap between them growing and shrinking based on the difference between the speed at which data is appearing at the serial port and that of the software which is handling it in the foreground. However, as long as the buffer is big enough to allow for this slack, no data will ever get overwritten. By the time the head pointer returns to the start of the buffer, the tail pointer should have retrieved the bytes that were there.

Having the head pointer overrun the tail pointer is really the only potential failing of this system. This will happen if the program which fetches the bytes consistently does so at a slower rate than the data appears at the serial port, and if this process continues long enough to fill the buffer. Unfortunately, there isn't really any way for the interrupt handler to cope with a buffer overrun condition which does not involve losing data. It has a choice of either refusing to handle any more input until the tail pointer moves, in which case incoming data will get lost, or it can overwrite the tail pointer, in which case previously stored data will get crunched.

In writing software which deals with interrupt driven serial data, it's important to make sure that the buffer is checked and cleared frequently, and that you allow for an interrupt driver data buffer which is big enough to handle the worst case of a foreground program going for lunch.

### A Byte of Code

Here's a simple interrupt handler in machine language. This is just the handler mechanism itself — there's a lot of ancillary code which accompanies it.

**SERIO\_SIZE EQU 500**

**;THIS GOES IN THE CODE SEGMENT  
SERIO\_HANDLER PROC FAR  
STI;ENABLE OTHER INTERRUPTS**

**PUSH AX  
PUSH BX  
PUSH CX  
PUSH DX  
PUSH SI  
PUSH DI  
PUSH DS  
PUSHES;SAVE AFFLICTED REGISTERS**

**MOV AX, DATA  
MOV DS, AX;GET THE LOCAL DATA  
SEGMENT**

**MOV DX, SERIO\_BASEPORT  
INAL, DX;GET THE BASE SERIAL PORT**

**;AND GET THE BYTE WAITING  
MOV BX, SERIO\_HEAD  
MOV SI, BX;HANDLE HEAD POINTER  
CALL BUMP\_POINTER  
MOV SERIO\_HEAD, BX  
MOV [SI], AL;SAVE BYTE**

**CLI  
MOVAL, 20H;SIGNAL END OF INTERRUPT  
OUT 20H, AL  
STI**

**POP ES  
POP DS  
POP DI  
POP SI  
POP DX  
POP CX  
POP BX  
POP AX;RESTORE REGISTERS  
IRET;RETURN FROM INTERRUPT  
SERIO\_HANDLER ENDP**

**BUMP\_POINTER PROC NEAR;INCREMENT A POINTER  
PUSH AX  
MOV AX, OFFSET SERIO\_BUFFER + SERIO\_SIZE  
INCBX**

**CMP BX, AX  
JGE BUMP\_PTR1  
POP AX  
RET**

**BUMP\_PTR1: MOV BX, OFFSET  
SERIO\_BUFFER  
POP AX  
RET  
BUMP\_POINTER ENDP**

**;THIS GOES IN THE DATA SEGMENT  
DGROUP GROUP DATA, BSS  
\_DATA SEGMENT WORD PUBLIC  
'DATA'**

**SERIO\_BASEPORT DW 03F8H  
SERIO\_TAIL DW OFFSET SERIO\_BUFFER  
SERIO\_HEAD DW OFFSET  
SERIO\_BUFFER  
SERIO\_BUFFER DB SERIO\_SIZE DUP(?)**

Through an as yet mysterious process, this bit of code will be called every time the 8250 senses a byte in its input buffer and thereby throws an interrupt. Now, this is a very simple serial interrupt handler — for one thing, it's under the belief that the *only* reason that an 8250 interrupt might come down the pipe would be because a character is waiting. In fact, as we'll see later on, there are lots of other reasons and it would be prudent to have the handler check the 8250 interrupt iden-



# Advertisers' Index

November 1989

Atlas Electronics .....	18
Canada Remote Systems cover	
Computer Parts Galore .insert	
Dell Computer Corp.....	2, 3
ECG Canada.....	cover
EMJ Data.....	4, insert
Exceltronix .....	46, 47
Fernbank Electronics	
Systems .....	cover
Glenwood Trading Co. ....	29
Hammond Manufacturing	
Co. Ltd.....	cover
Information Unlimited .....	29
K.B. Electronics .....	33, 41
McGraw - Hill.....	13
Orion.....	20, 21
Paco Electronics.....	cover
RETS of Toronto.....	7
The Pin Factory.....	39

**For Advertising  
Information Call  
(416) 445-5600  
Fax: 416-445-8149**

## CLASSIFIEDS

Where Buyers Find Sellers

COMPUTER PARTS SALE: For XT/AT/386 Compatibles. IC-Tester Adapters, Fax, Logic Analyzer Cards. Discount Prices, Catalogue. Write HES, P.O. Box 2752 Stn.-B, Kitchener, Ontario N2H 6N3

Power Supply-Versatile. Plus 1-15V (3A), minus 1-15V (1.5A) and +5V (1.5A)- with digital display of voltage and current. Includes 60 Hz TTL output. Detailed plans \$5.95. SASE brings information. Classic Designs, Box 142, Lachine, PQ H8S 4A6.

**For Advertising Information Call:  
(416) 445-5600 Or Fax:  
416-445-8149**

## PC Hardware Interfacing, Part 11

tification register to make sure that the data at the input buffer really is valid.

We'll deal with that another time, however.

When this function is called, the interrupt enable flag of the 8088 will have been switched off by the 8088. This means, for example, that if a keyboard character showed up while this routine was deliberating it would be lost. As such, the first thing to do is to turn this flag back on with the STI instruction. It's desirable to disable interrupts for as brief a period as possible on a machine like the PC which relies upon them so heavily.

The next thing to do is to preserve any registers which might get mangled in the course of executing the code of the handler. We do this by pushing them onto the stack. It's a good idea to just stick all the common registers up there, as in the course of developing an elaborate interrupt handler you may use registers you had not initially planned upon, which can lead to some spectacular system crashes that will be very hard to debug later on.

The actual interrupt itself saves three words on the stack before the processor gets to our handler. These are the current instruction pointer and code segment, which the interrupt will require in order to return to place in the foreground code which it got interrupted from, and the flags register. As such, we can happily trash the flags register without preserving it explicitly, as the 8088 does this one for us.

The next task is to fetch the data segment which the head and tail pointers and the data buffer live in. If this routine was part of a driver which was a resident code module, for example, everything would be in the same segment. In this case you would replace this

**MOVAX, DATA  
MOVDS, AX**

with this

**PUSHCS  
POPDS**

The second version just makes the current data segment equal to the current code segment. The code segment is, by definition, the segment in which our handler lives when it's being executed.

The next bit of code fetches the byte which has been received — the input buffer of the 8250 lives at the base port address. We then fetch the head pointer value and save the byte to it. The

BUMP\_POINTER routine handles the circular increment process, as we've discussed.

In this case we don't really use pointers but, rather, offsets into the serial data buffer. There's a good reason for this — on an 8088 pointers are thirty-two bits long, or four bytes, while these offset values are only sixteen bits. Since our buffer is somewhat less than sixty-four kilobytes in length, about sixty-three and half kilobytes less — we can get away with sixteen bit numbers, saving some space and some code.

The next bit of code is very mysterious.

**CLI  
MOVAL, 20H  
OUT20H, AL  
STI**

This has to do with the 8259 interrupt controller chip in the PC, which we haven't really had to deal with as yet. The 8259 allows the PC to cope with multiple interrupt sources, serving as a traffic cop when multiple interrupts happen at once. It makes sure that each hardware interrupt winds up having the processor call the correct vector, and it handles interrupt priorities.

The 8259 must know when our interrupt is done so it can be allowed to fire off another one if needs be. The aforementioned mysterious code is an "end of interrupt" signal. Because it would confuse the hell out of the 8259 if an interrupt happened in between these two instructions, we turn off the interrupts for the brief time during which the end of interrupt is being passed to the interrupt controller.

We'll speak of the interrupt controller in greater detail in future installments of this series.

The rest of the handler simply restores the registers and then returns from the interrupt.

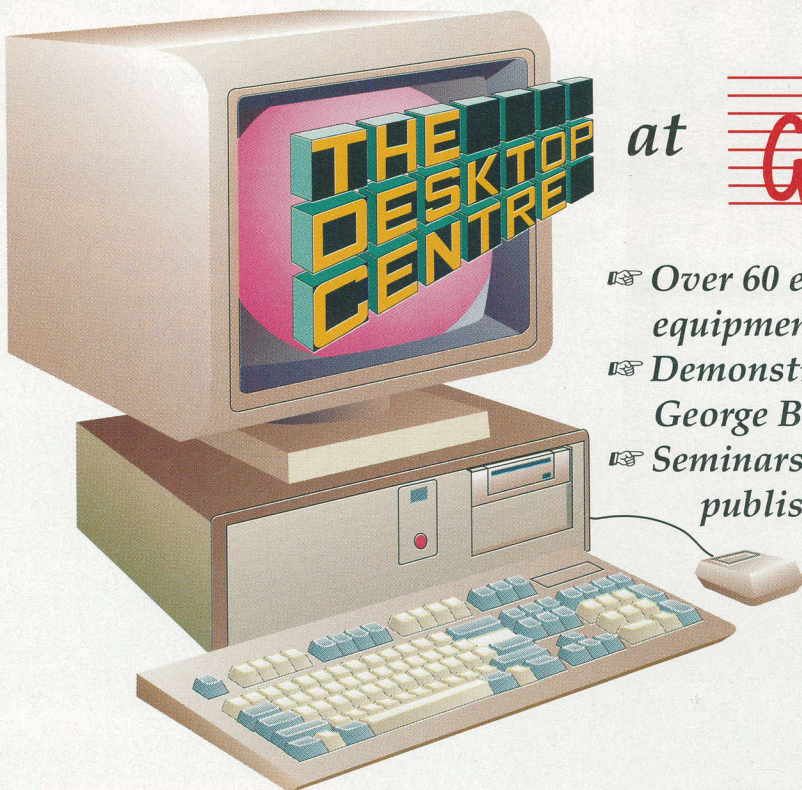
### Vectors in Space

While this should explain the mechanism of a very simple handler, there's still a lot of additional code required to make this thing into a workable serial port hardware driver. As it stands, this elegant little handler is sitting in space doing nothing because the PC doesn't know of its existence.

Next month we'll look at how it gets hooked into the guts of a PC so that it really starts to grab those bytes and bounce them into the buffer of your choice.



● EXHIBITS ● DEMONSTRATIONS  
● PRESENTATIONS ● WORKSHOP ● SEMINARS



at

*Graphic Trade '89*

- ☞ Over 60 exhibitor presentations featuring equipment, software and systems.
- ☞ Demonstrations by faculty and students from George Brown College.
- ☞ Seminars covering introductory and advanced publishing operations.

FRIDAY, NOVEMBER 17 TO  
MONDAY, NOVEMBER 20  
INTERNATIONAL CENTRE,  
(6900 AIRPORT RD., MISSISSAUGA)  
TORONTO, CANADA

**Over 60 exhibitors demonstrating the systems you need to produce print communications electronically**

For over 20 years, the Graphic Trade Show has been the printing industry's showcase for equipment, products, systems and ideas. Over 400 exhibitors will be showing at the 1989 show. Desktop/electronic publishing is a distinctive new technology that is becoming a major factor in print communications. To satisfy the market's need for more information and a better understanding of this high-tech printing technology, an exclusive desktop/electronic publishing Show will be featured in its own Hall at Graphic Trade '89.

One registration fee covers entrance to The Desktop Centre as well as to Graphic Trade '89, one of the most comprehensive graphic/printing exhibitions in North America.

**See what desktop publishing can do at a unique educational Workshop operated by George Brown College**

An unusual opportunity to see desktop/electronic publishing technology and products in action. Faculty and students from George Brown College, the leading educational facility for graphic arts will demonstrate what works and how. Learn what it's all about... ask questions... investigate the potential of desktop publishing for yourself and your company. Open to all Desktop Centre visitors.

**ELECTRONIC PUBLISHING SEMINARS**

**Leading specialists in electronic publishing at practical seminars in The Centre auditorium**

For an in-depth analysis of specific aspects of desktop technologies, The Desktop Centre will feature a program of seminars covering introductory and advanced desktop publishing subjects. Produced for the Centre by GAIM Plan and sponsored by Electronic Composition & Imaging magazine, the seminars will be held in the auditorium in Hall 6, the location of The Desktop Centre and the George Brown College educational workshop.

*For details on seminars (fees, speakers, etc.) contact GAIM plan: (416) 492 - 5777 or Fax: (416) 492 - 7595.*

**SHOW HOURS:**

FRI., NOV. 17 SAT., NOV. 18 SUN.,  
NOV. 19 10 A.M. - 7 P.M.  
MON., NOV. 20 10 A.M. - 6 P.M.

REGISTRATION FEE: \$15.

DESKTOP CENTRE REGISTRANTS MUST  
ENTER VIA ENTRANCE A, HALL 6.  
(ENTRANCE FACING AIRPORT RD.)

**THE DESKTOP CENTRE**

AT GRAPHIC TRADE '89  
PRODUCED BY: SOUTHEX EXHIBITIONS,  
A DIVISION OF



**Southam Business Information  
and Communications Group Inc.**

1450 DON MILLS RD., DON MILLS ONT.  
M3B 2X7

TELEPHONE: (416) 445-6641 FAX 442 - 2077

SPONSORED BY: CANADIAN PRINTING  
INDUSTRIES ASSOCIATION/PRINTING  
EQUIPMENT & SUPPLY DEALERS  
ASSOCIATION OF CANADA/  
L'ASSOCIATION DES ARTS GRAPHIQUES  
DU QUEBEC, INC.



**EXCELTRONIX  
EXPANDS  
WINNIPEG 204-942-8993**

# THE BEST

## Designed and Made

### **BEST COMPACT 386SX**

This newest addition to our computer line features the Intel 80386 SX 16 MHz microprocessor which uses a 16 bit external bus similar to the 286 AT compatible machines. However internally the 32 Bit 386-SX microprocessor is compatible with that of a 80386 processor. Socketed for optional 80387SX co-processor. Features 1 MB onboard RAM (optionally expandable onboard to 2MB and 4 MB RAM). Processor speed 16 MHz (switchable to 8 MHz), 8 expansion slots, Two serial ports, one parallel port, real time clock, one 1.2 MB floppy disk drive (optionally available with 5.25" 360K or 720K 3.5" floppy disk drive), 101 enhanced keyboard. Features a small footprint, yet it can take as many cards and drives (including hard drives) as full-sized models.

Since this machine has such extraordinary performance at such a low price, we believe it represents the best value in the market today.



### **BEST COMPACT 386-16**

(16 MHz, 8-slot 386 System)

Based on the Intel 80386 microprocessor, Phoenix BIOS, One 1.2MB Floppy Diskette Drive (Optional 360K 5.25" Floppy Drive or 720K 3.5" Floppy Drive), socketed for 80387 math co-processor, 8 Expansion Slots, Two Serial Ports, One Parallel Port, Real Time Clock, Floppy Controller and Hard Drive Controller, 101 Enhanced Keyboard. Available with 32-bit memory in the following RAM configurations: 2 Mb, 4MB, 8 MB, 16 MB. Features a small footprint, yet it can take as many cards and drives (including hard drives) as full-sized models.

Also available  
**COMPACT 386-20**  
a 20MHz version  
of the above configuration.



### **BEST PERFORMER 86 10-3**

(10 MHz, 3-slot XT Compatible)

Based on the 16-Bit 10MHz 8086 microprocessor, Phoenix BIOS, Available with one 360K 5.25" Floppy or up to two 720K 3.5" Floppy Diskette Drive, socketed for 8087 math co-processor, 640K RAM, 3 Full-Length XT Expansion Slots, Two Serial Ports, One Parallel Port, Real Time Clock. Also features On-Board Hercules Compatible Display Adapter, Floppy Controller and SCSI Hard Drive controller, key lock for system and case, 101 Enhanced Keyboard. Optional extras include 20 MB SCSI Hard Drive or 40MB SCSI Hard Drive.



### **Exceltronix 3 and 5**

- Basic **BEST** System —
- **BEST** computer system board
- Hard drives and other peripherals cards
- All our systems

# **Exceltronix**



# T RANGE

## h Canada with Pride

### BEST PERFORMER 286/12-3

(12 MHz, 3-slots AT Compatible)

Based on the Intel 80286 microprocessor, Phoenix BIOS, One 1.2MB Floppy Diskette Drive (Optionally, use up to two 3.5" 720K or 3.5" 1.44MB Floppy Drives in place of the 1.2 MB Drive), socketed for 80287 math co-processor, 640K RAM (Optionally expandable to 1 MB onboard or higher using 16-Bit memory expansion cards), 3 Full-Length Expansion Slots, Two Serial Ports, One Parallel Port, Real Time Clock, Floppy Controller and a Connors Hard Drive Controller, key lock for system and case, 101 Enhanced Keyboard.

### BEST COMPACT 286-16

(16 MHz, 8-slot AT Compatible)

Based on the Intel 80286 microprocessor, Phoenix BIOS, One 1.2MB Floppy Diskette Drive (Optional 360K 5.25" Floppy Drive or 720K 3.5" Floppy Drive or 1.44MB 3.5" Floppy Drive), socketed for 80287 math co-processor, 640K RAM (Optionally expandable to 1 MB onboard or higher using 16-Bit memory expansion cards), 8 Expansion Slots, Two Serial Ports, One Parallel Port, Real Time Clock, Floppy Controller and Hard Drive Controller, 101 Enhanced Keyboard.

Other BEST Compact 286 Models (which incorporate the above standard features) are:

COMPACT 286-8: Runs at 8MHz

COMPACT 286-10: Runs at 10MHz

COMPACT 286-12: Runs at 12MHz

# NEW!

## BEST ELITE 386-33/0

Exceltronix introduces the BEST ELITE 33 Mhz 80386-0 Wait State with Cache Memory at an incredible introductory price offer.

Basic ELITE 386-33/0 System includes: Intel 80386 32 Bit Microprocessor, 32K cache memory, 0 wait state, 1 1.2 Meg Floppy Disk Drive (optional 360K 5 1/4" Floppy Drive, or 1.44 MB 3.5" Floppy Drive), Socketed for 80387 math co-processor, 8 expansion slots, 2 serial ports, 1 parallel port, real time clock, floppy controller, hard drive controller, heavy duty power supply, 101 enhanced keyboard. Available with the following memory configurations: 1 Mb, 2 Mb, 4 Mb, 8 Mb, 16 Mb of 32 Bit on board memory. Attractively packaged in a tower case with lots of room for expansion. Includes 1Mb of Ram.

# ONLY \$2995

For systems which have the same features except have no cache memory see our **AVX 386-20** (1 Mb) at \$1,995 or our **AVX 386-16** (1 Mb) (not in tower case) \$1,695 (see page 3 for details).

**SPECIAL  
PERFORMER 286/10 - 3**  
(as above but 10 MHz)

**\$699**  
With 40 Meg Connors  
Harddrive (28mS)  
**\$995**

**SPECIAL  
COMPACT 286-12**

**\$899**  
**COMPACT 286-12**  
12 MHz version with 40 Meg  
Connors Harddrive (28mS)  
**\$1395**

## 3 YEAR WARRANTY

3 years parts and labour  
5 years parts and labour  
by the original manufacturer's warranty  
e CSA approved

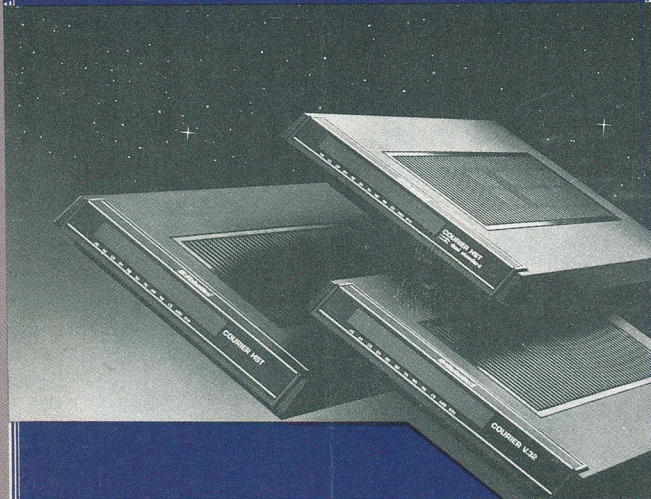
321 College Street, Toronto  
433 Horner Avenue, Unit 12, Etobicoke, M8W 4Y4 (416) 252-8543 FAX (416) 252-5124  
360 Albert Street, Suite 1510 Ottawa, K1R 7X7 (613) 235-2378 FAX (613) 235-2416  
Halifax: (902) 454-0052 Edmonton: (403) 483-4271 Montreal: (514) 849-5872



April, 1989

Toronto Area  
Ont., P.Q., N.B., N.S., P.E.I.  
Rest of Canada

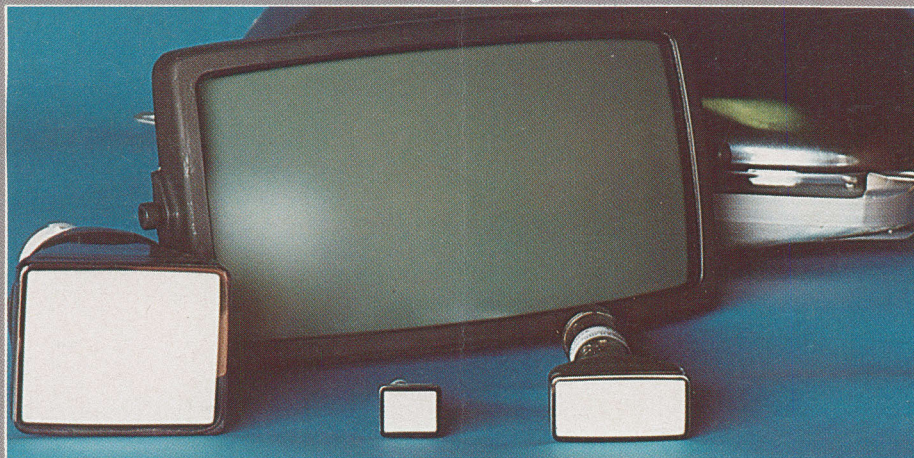
624-8193 or 231-2383  
800-668-4706  
800-387-3347



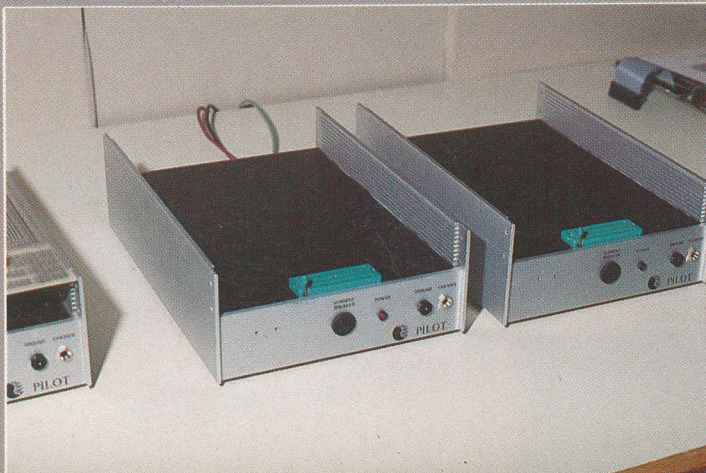
- IBM
- MACINTOSH
- CP/M
- C64
- APPLE II GS
- AMIGA
- ATARI ST

- CANADA'S LARGEST BBS
- THOUSANDS OF PROGRAMS
- NOVELL NETWORKS
- MODEMS
- SAVINGS
- SERVICE
- MUCH MORE

CANADA REMOTE SYSTEMS, Catalogue—Circle #4 on RSC



ECG CANADA, Replacement Data Display Tube—Circle #5 on RSC



FERNBANK ELECTRONICS, Analog ATE System—Circle #6 on RSC



PACO ELECTRONICS, Chemtronics Env. Safe Products—Circle #7 on RSC